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PUBLIC SQUARE, TRAFFIC CENTER OF CLEVELAND, OHIO

THE paving situation in Cleveland is of unusual interest because that city stands high in the records of the United States Census in the percentage of paved streets in relation both to population and to the length of all streets. Furthermore, one paving material—brick—has been steadily growing in favor until last year over 90 per cent. of all the work completed was built of that material, and Cleveland has now more miles of brick-paved streets than any other city of the United States. The history of paving in Cleveland during the past fifteen years will show how brick has displaced other good paving materials and will also shed some light on the question as to the extent to which local conditions and the merits of the material have contributed to the result.

Before the year 1889, there had been laid in Cleveland three kinds of pavement—tar concrete, Nicholson wood blocks and Medina stone. The tar concrete was of the sort laid in Washington during the period from about 1870 to 1885, about all of which proved a failure there; and the Cleveland variety was poor of its kind, was a failure from the beginning and little of it was laid. The Nicholson pavements did not prove very satisfactory owing partly to the fact that the tar with which the blocks were treated was too volatile, and because not sufficient attention was paid to the maintenance.

Stone blocks made of Medina sandstone were also laid at an early period and, except for the fact that the blocks were not as well shaped as they were later, these pavements were very satisfactory, some of them giving fair service to this day. For a few years Medina was about the only paving material used in Cleveland. This stone, which occurs in Medina county and thereabouts in New York State, has great merits for paving purposes. The stone is gritty enough to give a good foothold to horses and is hard enough to withstand ordinary traffic. Moreover, it has the peculiarity of wearing flat and the blocks do not round off to a cobble-shaped top like most granite or chip off at the joints. The principal objection to the material is the expense, and of course, like all hard block pavements, it is noisy.

Asphalt was the first material to challenge the supremacy of Medina stone in Cleveland. The promoters of this material probably made the hardest, and in some respects the most picturesque, fight that has ever been made in any American city in behalf of any paving material. Committees were taken all over the country to examine and report on

asphalt streets, advertising space was bought in the papers and circulars were mailed to property owners and citizens generally in such abundance that after a while sensible people threw them in the waste basket as soon as their eyes caught the word asphalt. In time asphalt was introduced on a number of small streets and on one long one.

At about this same time, however, brick pavements were coming into use in the small cities. From the beginning this class of paving material had an advantage over asphalt in cost, a matter of almost controlling importance where pavements are laid on request of property owners who have the assessments to pay. As soon as a few years' trial removed the doubts as to durability, brick rapidly became the favorite paving material. At first small blocks were used, but these were increased in size later; and the year 1895, which is chosen for comparing the past and the present status of the paving question in Cleveland, marks the time when blocks five inches in depth came into general use. At the same time the

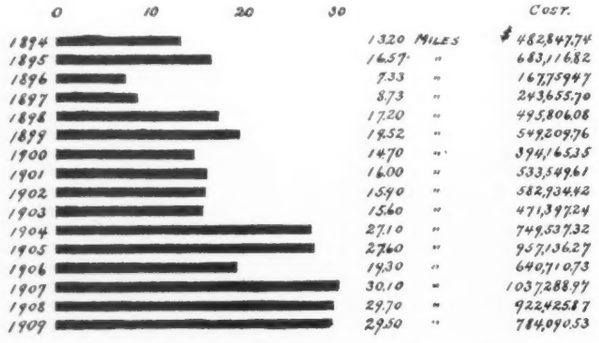
CLEVELAND'S FIRST ASPHALT PAVEMENT BEING REPLACED WITH BRICK

use of the tar filler in the joints was discontinued and cement grout filler was adopted. The first brick pavement, laid in 1889, had sand filled joints and a few other streets were laid this way, but in practically all of the pavements laid between 1889 and 1895 tar filler was used. In 1895 the total amounts of all kinds of existing pavements were as follows:

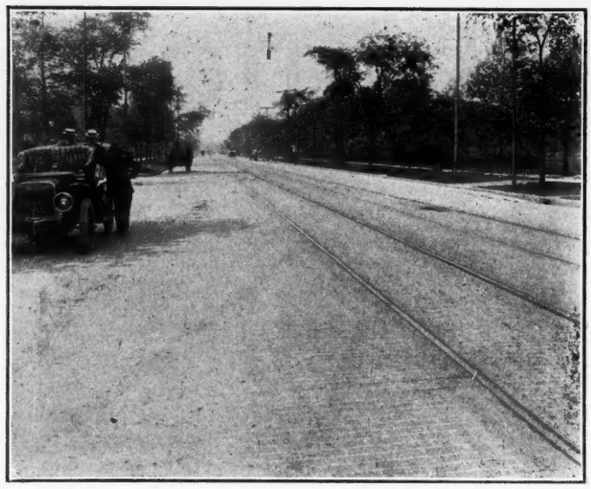
	Miles.
Asphalt	3.94
Medina stone	85.97
Brick	29.22
Wood	1.46
Cinder macadam	.73
Cobble stone	.05
Miscellaneous	.67
Total	122.04

The amount of work completed that year was: Brick 5.91; Medina blocks, 7.50; common Medina, 3.06; asphalt 0.1. The prevailing contract prices per square foot that year were: Medina blocks, 28½ to 31½ cents; Common Medina, 21 to 21¾ cents; Brick 10 to 11 cents; Asphalt, 33 cents.

At the close of the year 1909 the total amounts of all existing pavements in miles was as follows:



MILES OF CLEVELAND STREETS PAVED, BY YEARS



FIVE-INCH BRICK ON CONCRETE. FOUR YEARS OLD

Medina stone on concrete, dressed blocks	7.2	
Medina stone on concrete, common blocks	2.0	
Medina stone on sand, dressed blocks	50.0	
Medina stone on sand, common blocks	36.5	
		95.7
Sheet asphalt		24.6
Brick on concrete	30.0	
Brick on sand	231.5	
		261.5
Tar macadam		.7
Bitulithic		.4
Limestone macadam		1.5
Wood		1.1
Total		385.5

The mileage of streets completed during the year was as follows:

Tar macadam	.1
Asphalt	1.1
Medina stone	1.0
Brick	27.3
Total	29.5

The prevailing contract prices were about as follows: 5-inch brick on sand, 14 cents per square foot, 5-inch brick on concrete, 20 cents; Medina blocks on sand, 30 cents; on concrete, 36 cents; asphalt, 23 cents; Medina, common, 26 cents; bituminous macadam, 25 cents.

The low prevailing contract prices noted above are partly the result of the fortunate situation of Cleveland as regards

FIVE-INCH BRICK ON SIX-INCH CONCRETE. HARD-TRAVELLED STREET. FOUR YEARS OLD

local conditions and supplies, and partly the result of specialization. Where any one kind of paving material is used in a city to the practical exclusion of others, an opportunity is afforded for the development of a great organization with many ramifications tributary to the industry. In the first place, the soil in the part of the city where pavements were first laid made the usual concrete foundation unnecessary. The soil is a fine sand with some loam, but not enough to prevent it from being very pervious to water. Hence by the use of water for compacting the soil a sufficiently stable foundation was secured. If concrete had been necessary, the brick paving industry would have been handicapped, because concrete was then much more expensive to lay than it is now.

Cleveland possesses another advantage, in that it is more favorably situated than any other city of its size so far as propinquity to the brickmaking centers is concerned. The first brick used in Cleveland were shipped in from considerable

ONE OF THE BRICK PLANTS WHICH SUPPLIES CLEVELAND

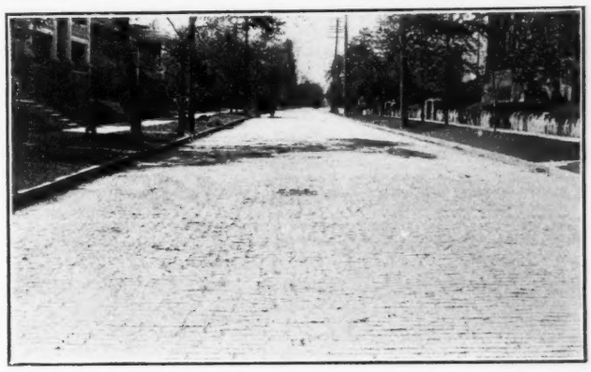
distances. Porter, Union and Canton brick figured largely in the early days. In recent years, since 1895, five companies have established brick making plants within the switching limits of Cleveland—that is within limits in which the freight rate is 25 cents a ton to any point within the district. These companies are the Deckman-Duty, at Collingwood; Metropolitan at Willow; and the Newburg Brick and Clay Co., the Cleveland Brick and Clay Co., and John Kline and Co. at Wychleff. The history of the Bessemer brick affords an interesting sidelight on the development of a source of supply as the result of a great demand. These bricks are made by a company in Youngstown whose principal business was the quarrying of limestone. Over the bed of limestone was a bed of shale that had to be removed and was a source of expense in the regular business. To utilize the waste, the manufacture of paving brick was undertaken and the bricks were shipped to Cleveland. In time the brick-making became a bigger industry than the limestone quarrying. Later, when the competition from plants nearer Cleveland became pressing, expensive continuous kilns were introduced and the cost of manufacture so reduced that the 65-cent freight rate was not prohibitive. Four-inch paving brick can be bought for about $16 per thousand in Cleveland and five-inch block for $20, both running about 40 to the square yard.

Cement, too, is low in Cleveland, water competition making railroad rates low, moreover Portland cement is made at Sandusky and other near-by points. Sand for grout and coarse sand for ballast or cushion is supplied by a company that dredges with pumps from the bottom of Lake Erie. This company has excellent facilities for unloading from the scows and transferring to cars. The third material used in concrete, stone, is not so cheap in comparison, but is no more expensive than in many cities. Limestone may be obtained from immense quarries owned by the Kelley Island Company, Sandusky, and a hard sandstone is obtained from a quarry near the city. Crushed stone costs about $1.25 per cubic yard on cars anywhere in the city. At the iron furnaces near the city slag is crushed, which also is used for foundation purposes.

In cost of maintenance and durability, brick pavements have made good in Cleveland. Since the first pavement was laid in 1889 only two streets have given out sufficiently to require resurfacing. Jennings avenue was one of these. This street was paved in 1890 with small bricks, probably Porter, laid on a sand foundation with sand joints. In spite of the inferior construction, this street held out until 1908, when it was replaced with a five-inch brick laid on a concrete foundation. The other street was Detroit avenue, laid by the village government in territory since annexed to the city. This street was pavd originally in 1889 with the same general construction as Jennings avenue. It also was repaved with five-inch brick on concrete in 1908.

FIVE-INCH BRICK ON SAND, CEMENT FILLER. SIX YEARS OLD

Regarding the cost of maintenance few details are readily accessible, but sufficient to bring out prominently the fact that the cost of maintaining the pavements in Cleveland is very low. In 1909 the Superintendent of Streets, who has charge of all repair work, spent $118,400 on paved streets. Of this sum $59,747 was recovered from plumbers and others who made openings in the streets, for which work they are charged cost plus 15 per cent. The balance, $58,653, is the total expenditure for maintaining about 7,000,000 square yards of pavements of all kinds. As the percentage of brick so greatly exceeds that of all others and the cost per square yard is so low, the error is not great in prorating this cost over the whole yardage and assuming the figure obtained to be the cost of maintaining brick. This amounts to less than one cent per square yard. It may be true that the maintenance ought to be more and an allowance made for renewals. But the same argument holds true of other pavements in other cities; as in New York for instance, where 15 cents per square yard is spent for maintaining pavements, and even that sum is not sufficient. It is true also in Washington, where a charge of from 5 to 10 cents per square yard does not keep the streets up to a uniform standard of excellence. However, a just comparison would require a consideration of the relative traffic on the streets of the several cities.



FIVE-INCH BRICK ON SAND, TAR FILLER. FOURTEEN YEARS OLD

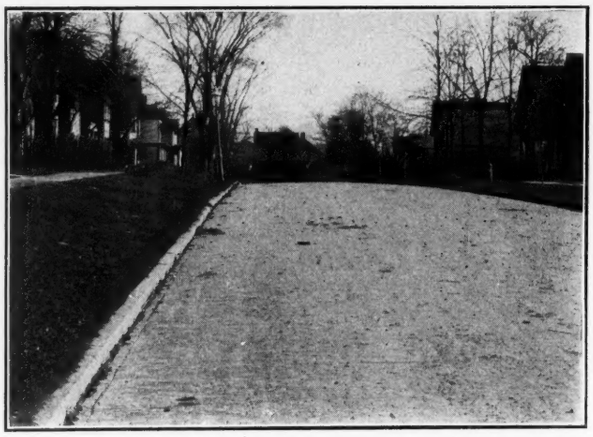
Methods of constructing brick pavements in Cleveland have been influenced by the peculiar soil that is found in certain parts of the city, mostly the old part, where, in the vicinity of the lake front and of old stream beds, in ages past a fine sandy material has been deposited. The method of preparing the foundation is peculiar to Cleveland. After the rough dirt has been excavated, dams are built dividing the roadbed approximately into squares and these are filled with water. The water is usually turned on at night and by the following morning will have all disappeared. If there were any old trenches in the street not well settled they will be shown by depressions. The dams are then leveled, the depressions filled and the surface shaped and rolled in the usual way. A bed of ballast eight inches thick is laid on streets where the natural soil is not of sand. This has been the most general method of construction since five-inch brick were used. These brick, cemented with grout, perform practically the same service as a bed of the same thickness of concrete. Of course it is not claimed that this monolithic surface of five inches is as strong as a surface of four inches of brick and a layer of four inches of concrete besides. But the experience with this construction in ordinary streets has been eminently satisfactory.

Where concrete is used as a foundation, it may be four inches thick or, if the street is very heavily traveled or has car tracks, it may be six inches thick. Portland cement only is used. The mixture is one part of cement, three of sand

and six of broken stone. In the case of hand mixing, the mortar is made before stone is added. The large contractors as a rule use concrete mixers. A cushion coat of sand two inches thick is laid over the concrete.

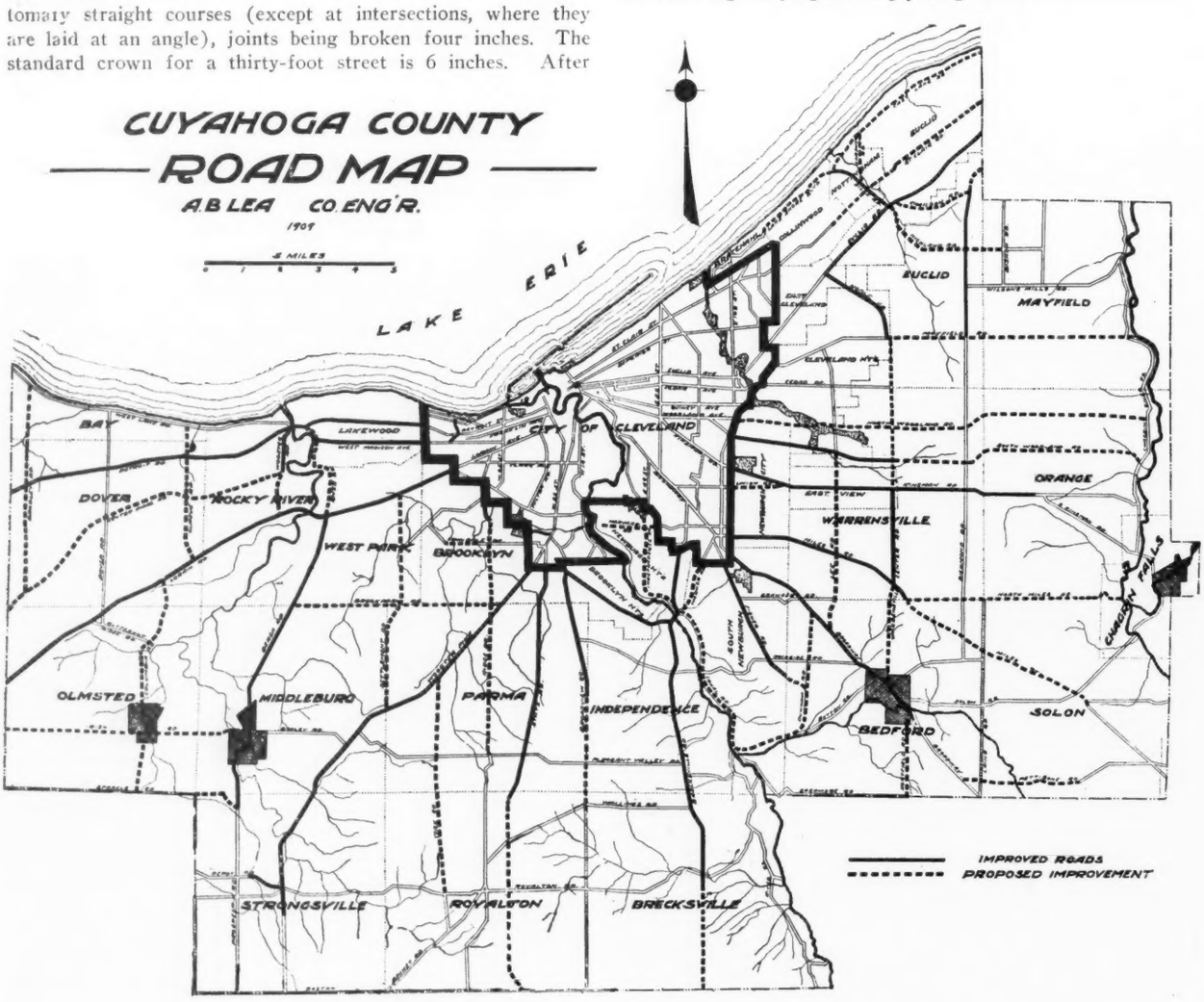
The paving brick which are allowed to be used are described in the specifications as "the best quality of sound, hard burned, vitrified, machine pressed paving brick, made and burned expressly for street paving purposes." The surface dimensions are 3 by 8½ inches and the depth 5 or 4 inches. The usual indentations are made at the ends of the brick and quarter inch projections on one side, one near each corner, for the purpose of keeping them apart. Brick with square rather than rounded edges are used. Any brick when subjected to the standard rattler test of the National Paving Brick Manufacturers Association for one hour must lose not more than 20 per cent. in weight. Bricks equivalent to eight per cent. of the volume of the rattler (which is 12,300 cubic inches), are put in the machine with a shot charge of 75 lbs. of 2¼ by 2½ by 4½-inch cast iron blocks, and 225 lbs. of 1½-in. cast iron cubes. The amount of water absorbed in a 48-hour test after 24 hours baking must not exceed 4 per cent. In a city like Cleveland, where brick have been laid for so many years and the engineering force has been permanent, being unaffectd by changes of administration, there will naturally have grown up a corps of engineers and inspectors who are good judges of brick and can reject the poor ones at sight. Practically they do this, but condemned brick are of course subject to test.

Before laying the brick, a board is laid alongside the curb and a row of brick laid lengthwise next to it. Before the rest of the roadway is grouted this board is removed and the joint filled with bituminous filler. The bricks are laid in the customary straight courses (except at intersections, where they are laid at an angle), joints being broken four inches. The standard crown for a thirty-foot street is 6 inches. After



PAVED WITH BRICK IN 1904. SHOWS LONGITUDINAL BRICK ALONG CURB. CLEVELAND

laying. the bricks are rammed and rolled. Care is used throughout to avoid chipping. The contractors as a rule use tongs and conveyors in handling the bricks both from cars to wagons and from the piles alongside of the street to the work. The conveyor most used is simply a frame carrying roller whose axles have roller bearings. Another type of conveyor used, an invention of a Cleveland foreman, is a trianguiar framework, two of the sides being approximately level, one of which carries a trolley by which the tongs with a load of bricks is carried to the point of delivery by gravity, and the other leg carrying the empty tongs back.



IMPROVED ROADS IN CUYAHOGA COUNTY, OHIO

The final process of paving is the grout filling of the joints. This is made one part Portland cement and one part of sharp lake sand. The sand and cement are mixed dry first and after the water has been added is kept in agitation constantly. The grout is swept into the joints with brooms, each portion of the surface being gone over twice and if necessary three times or more. Traffic is kept off the street for seven days.

Particular attention is paid to the details of construction, such as the application of the cement grout. On most of the pavements Cleveland uses the cement grout in preference to the bituminous filler, as they find the brick chip less at the edges; although a few streets have been filled with the latter.

ROADS OF CUYAHOGA COUNTY

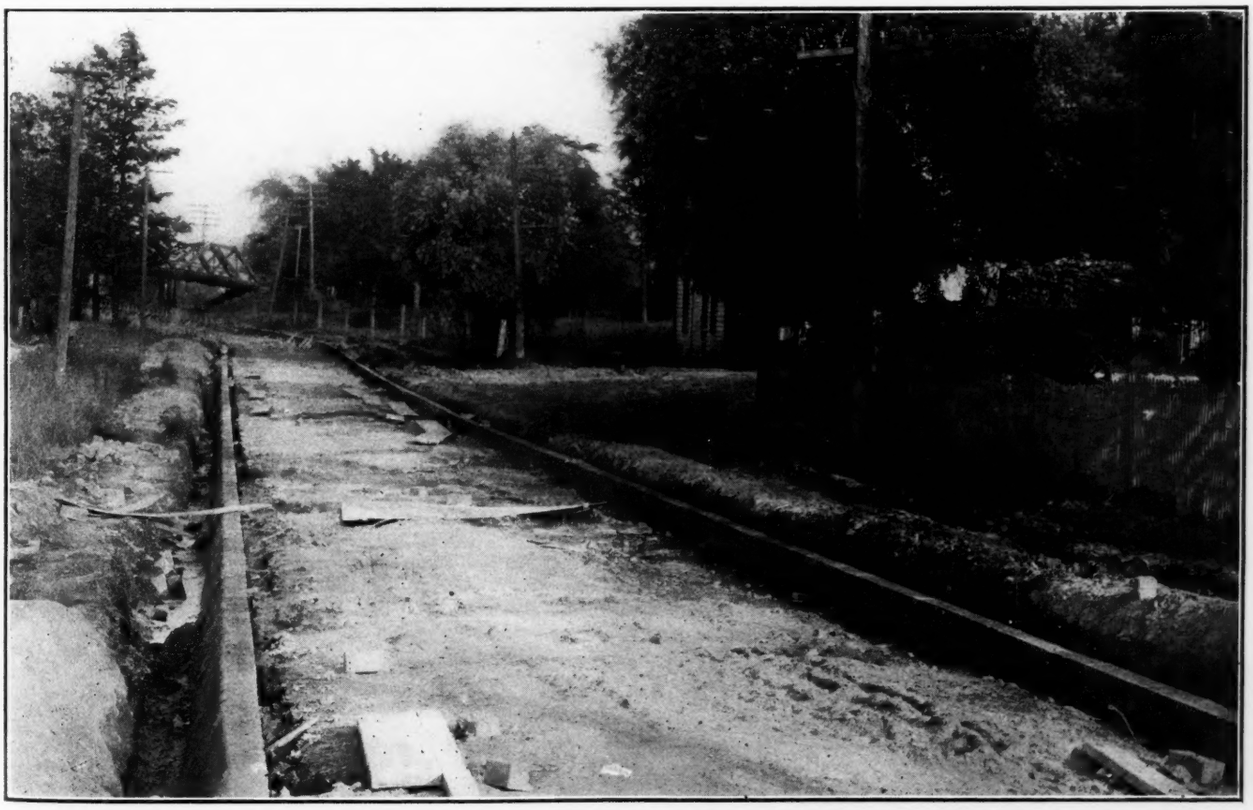
Cuyahoga County, Ohio, is said to have more miles of permanent pavement than any other county in the United States, and excepting counties that are included wholly within city limits, the statement is probably correct. However, the fact that the city of Cleveland, with its half million inhabitants and its high valuation is located within the county, is an important factor in bringing about this condition, for Cleveland paid 85.7 per cent. of the county road tax in 1909. As the county extends over a territory 31 miles in length by 16 miles in width, many of the roads are of the usual character of county roads, and the methods adopted in improving them are similar to those used in hundreds of other countries.

Public work began on a large scale eight years ago, and in the season of 1909 the engineering department had under its supervision the construction of 165 miles of pavements, besides that of two large bridges and a number of smaller improvements. To manage all this work requires an organization of unusual size, and during the busy season the engineer's office employs as many as one hundred men. The County Engineer is elected by the citizens, and he appoints two assistant engineers, one to have charge of bridges and the other of roads. During 1909 A. B. Lea, who has since been appointed Director of Public Service for the city of Cleveland, was County Engineer. Assistant engineers, draughtsmen and experienced inspectors are also included in the force. Daily reports are made by the inspectors and mailed to the engineer's office. All records are filed in accordance with an excellent system in charge of special filing clerks.

The system adopted for carrying out the plans of permanent paving contemplates, first, the paving of the main thoroughfares leading out of the city, and afterwards the cross-roads, thus forming a network of roads spreading over the whole county. This method best meets the needs of the two classes of citizens who use the roads—those who carry farm products to the city and those who travel from the city to their suburban homes or for pleasure. The benefits derived from the improvements also are two-fold, and they are not imaginary but are very practical matters well recognized by citizens generally. The farmer or market gardener, not hampered by the former difficulty of getting to market over bad roads in wet weather, can choose his own time for carrying his produce to the city. This has a tendency to equalize prices in the city market, as the supply is made to meet the demand. The other marked advantage is the enhancement in real estate values, particularly in the demand created for house lots on the part of city-dwellers desiring to escape the evils of congested population.

The presence of a trolley line alone is not sufficient to induce town-dwellers to move to the country, but they demand paved streets as well. County Commissioner Fisher says that the improvement of Bedford road, shown in one of the illustrations, increased the value of property from 50 to 75 per cent. The improvement of North Ridge road, according to the same authority, increased the value of adjoining property fully 100 per cent.

The natural soil of Cuyahoga county is clay of such a sticky nature that before the recent improvements the city was practically cut off from the country in wet weather. There were, it is true, some forty miles of plank roads which alleviated conditions to a limited extent; and an attempt at road improvement had been made by macadamizing, the clay foundation being rolled, a six inch layer of 2½-inch broken stone being laid first, covered with finer stone to a depth of four inches, and finally screenings being sprinkled over



MILES AVENUE, SHOWING TYPE OF CONCRETE CURB WITH SLANTING OUTER FACE, COUNTY WORK

the surface to fill the voids. These roads were failures because the stone used was not of a good quality for road making, questions of drainage had not been given proper attention and maintenance was neglected.

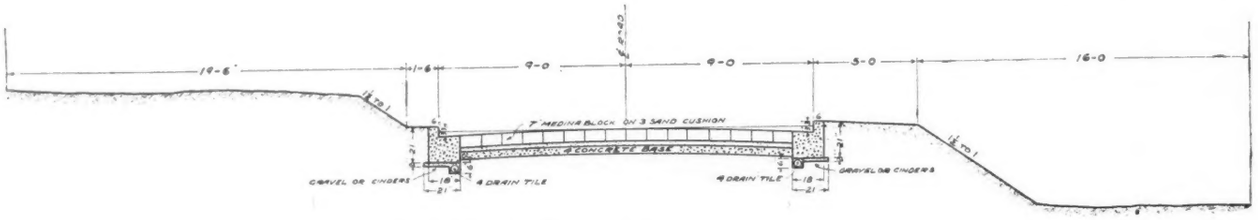
Thirteen years ago the county decided to experiment with brick, and two roads were built of a width of only eight feet, as they were built without proper drainage and without proper inspection during construction, these roads were not as successful as it was anticipated that they would be. They have been repaired recently and are now serviceable, although too narrow. Six years ago bitulithic was tried, but, probably from the lack of proper drainage, it has broken up to some extent.

The class of paving that is now being laid in Cuyahoga county, brick on concrete, is laid in accordance with the provisions of the Dodge law, which requires that the owners of a majority of the frontage on the proposed improvement petition for the grading, draining and improving of the road. The selection of the kind of paving is left to the decision of the County Commissioners. Included in the petition is a waiver of damages which the property-owners are requested to sign, releasing the county from any damages arising in any manner from the improvement. Following this petition the County Engineer makes plans and estimates of the cost and the commissioners make the assessment, which takes into consideration frontage, depth of property, character of soil and distance from the city of Cleveland. Usually it amounts to 25 per cent. of the total cost. The assessment and the advertisement for bids are usually published at the same time. The contract cannot be awarded until the assessment has been certified to the County Auditor for collection and ten per cent. of the amount—about 2½ per cent. of the contract price—has been paid into the county treasury. The County Commissioners are allowed to issue bonds to the amount of one per cent. of the tax duplicate, which gives it a fund of $3,000,000 to carry on work. Special legislation was obtained to facilitate the maintenance of roads, and competitive bids are received for materials and labor employed directly in repairs.

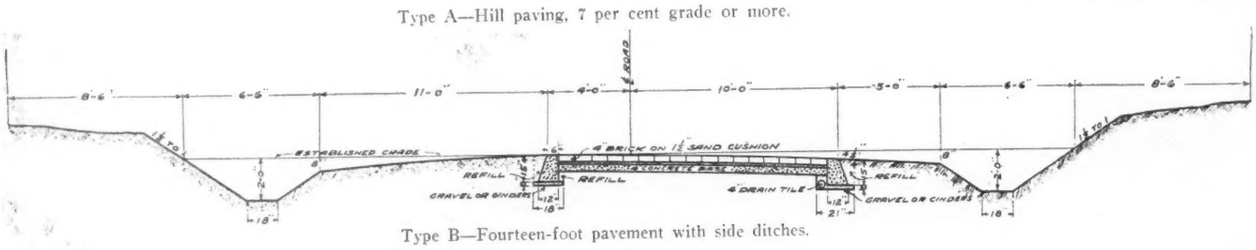
Work carried on under these laws consists generally of a roadway 30 feet wide between ditches. A curb is set four or five feet from one of the ditches. A brick pavement four inches thick on a four-inch concrete base is laid for a width of fourteen feet. This leaves a dirt road of eleven or twelve feet between the inner curb and the second ditch. The dirt roadway is much used by farmers in dry weather, as under those conditions they prefer it to the hard brick road.

Either sandstone or concrete curbing is used. The concrete curbing is six inches wide at the top, twelve at the base and fifteen deep. The sandstone curbing is four or five inches wide and fifteen inches deep.

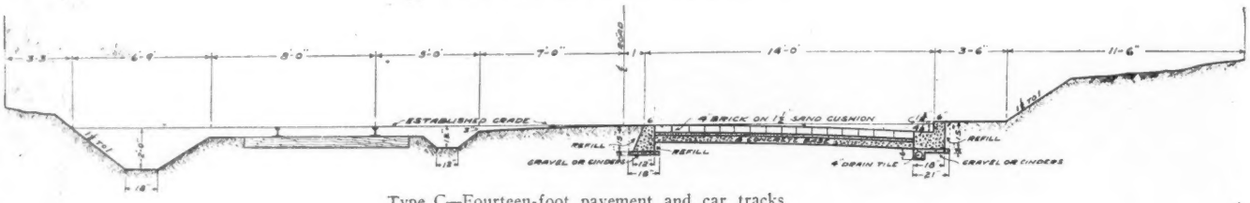
The specifications require that the brick used in the roadway shall be free from marked warping or distortion and uniform in size so as to fit closely together and make a smooth pavement. They must be homogeneous in texture and free from laminations and seams, evenly burned and thoroughly vitrified. Bricks kiln-marked to a heighth or a depth of over 3/16-inch are rejected. Rounded corners, the radius of which



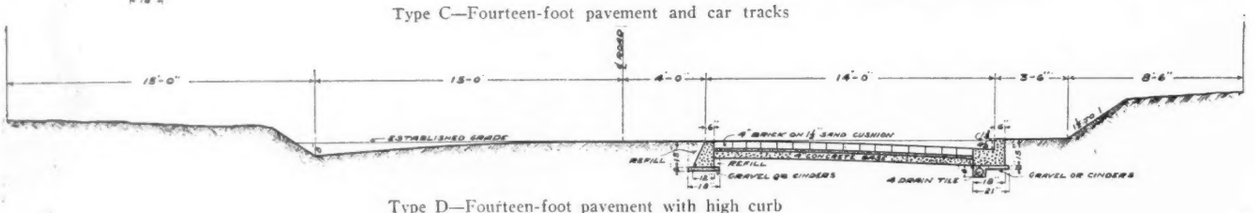
Type A—Hill paving, 7 per cent grade or more.



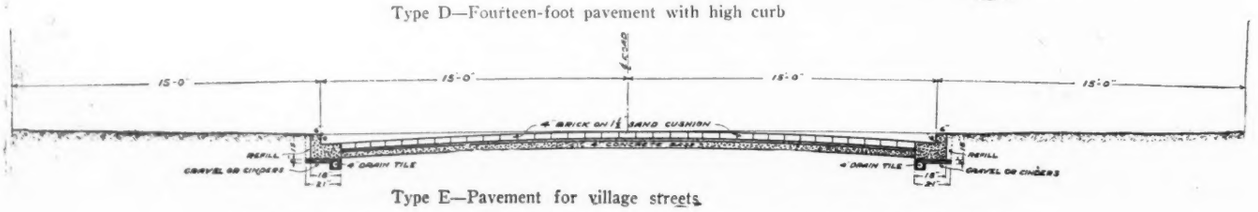
Type B—Fourteen-foot pavement with side ditches.



Type C—Fourteen-foot pavement and car tracks



Type D—Fourteen-foot pavement with high curb



Type E—Pavement for village streets.

TYPICAL CROSS SECTIONS OF CUYAHOGA COUNTY STANDARD PAVEMENTS

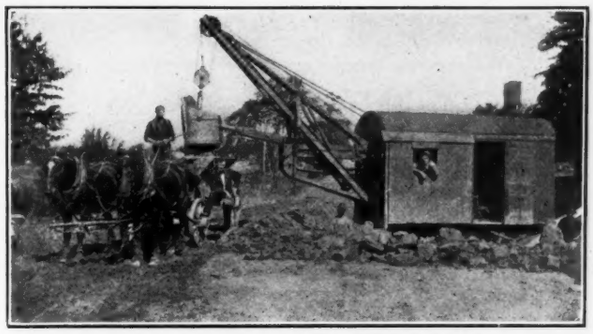
is from one-eighth to one-quarter of an inch, are required. Bricks must have not less than four nor more than six lugs or projections on one or both sides of the bricks, the area of each lug to be not more than one-half of one square inch, so that when laid there shall be a separation of at least ⅛ inch and not more than ¼ inch. Imprints of the name of the maker must be by recessed letters. The ends of the bricks must have a semi-circular groove so located that when the bricks are laid together the grooves will match. The size of the bricks shall not be less than 3¼ by 4 by 8½ nor more than 3½ by 4 by 9 inches. Any bricks that loose over 20 per cent in the rattler standard test, or increase more than 4 per cent after immersion in water for 48 hours, are rejected. On grades of 5 per cent or over a special form of brick suitable for steep grades is used.

Standard practice is followed in all matters of construction just as strictly as in laying city pavements. The subgrade is rolled with a steam roller. The concrete base, 4 inches thick, is composed of one part Portland cement, 2½ parts of sand and 5 parts of broken slag or stone of a 1½-inch size. If mixing is done by hand the cement and sand are mixed dry before the aggregate is added. On the concrete a two-inch cushion of sand is laid and shaped by a template. Bricks are laid at right angles to the curb lines, except at intersections. Longitudinal joints are broken by a lap of half the length of the brick. End joints are made close by the use of a steel bar applied to the ends next the curb. Every fourth course of bricks must be straightened in a manner satisfactory to the engineer. After a sufficient number of bricks are laid the pavement is sprinkled with water and soft or misshapen bricks are

COUNTY ROAD. FOUR-INCH BRICK, CONCRETE BASE, STONE CURB

removed. After rolling, the bricks are again inspected and any necessary replacements made. Grout is then applied in two coats to fill the joints to the top, but to insure that they are absolutely flush another sweeping of cement is required before the second has secured its initial set. A complete system of drainage is constructed in connection with the paving, just as in city streets, including storm water drains, catch basins and iron inlets.

Although the pavements laid in the county are practically city pavements, there are differences in construction methods. The high cost of transportation would make an eight-inch bed of ballast cost nearly as much as concrete, perhaps more in some locations. In all cases the grading is heavier, because in constructing the new roads the grades are improved by cuts and fills of considerable depth. Baldwin Brothers, of Cleveland, the largest single contractor for county work in 1909, and employing the largest plant, used a "New Era" grader with excellent results in grading some of the roads. On other jobs they had a Thew automatic steam shovel, which propelled itself on wide-tread wheels instead of the usual track. The contractors state that on cuts of 3½ feet they were able to develop the whole capacity of this shovel—from four to six hundred cubic yards a day. They found that it paid to use the shovel on cuts as light as 1½ feet. The way in which the shovel swings around at an angle of 90 degrees makes it very handy in loading wagons, as is shown in the illustration. At one time Baldwin Brothers had at work nineteen gasoline or steam engines. Bringing water to the work for concrete mixing and for the



THEW AUTOMOBILE STEAM TRACTION SHOVEL

engines they found a troublesome problem. They used a gasoline engine and a pump at the source of supply and in one instance laid two miles of pipe to carry water to the work. Transportation is another problem more difficult to solve than in the case of work in a city. Avery and other traction engines were used with trains of Troy three-yard wagons made for such purposes. While good results were obtained on jobs where this outfit is suited to the conditions, the results at other times were disappointing. On long hauls over good roads with no very steep grades there is no doubt of the superiority of the traction proposition, but wet weather, bad roads and steep grades seriously interfere with its operation. Moreover, in all cases the method of loading and unloading requires to be carefully studied out in advance. The amount to be loaded and unloaded at one time is large, and the problem is to keep the men occupied between loads. Keeping them in motion by carrying them on the train does not solve the difficulty. While the traction outfit is almost indispensable in work of this kind, situated as it often is far from railroads, it behooves any one who intends to try it to work out his problem very carefully in advance.

COLUMBUS PAVEMENTS

Columbus, Ohio is a most progressive city in many branches of public work. There have recently been completed a water filtration and purification plant turning out an adequate supply of clean water and a sewage purification plant which is the second largest in the country. The sewage works including septic tanks and sprinkling filters have served as models for other installations and their operation is being waatched by engineers and others who are or may be engaged in solving similar problems of disposal in other cities. There is now approaching completion the first garbage reduction plant ever built wholly new by any American city, and the second one to be operated by a city. A municipal electric plant lights the city streets and has proved so satisfactory that its capacity has been greatly enlarged. The main street, lighted by arches, is justly famous for its attractive appearance, although it is doubtful if the intensity of the illumination is as great as on the streets of some other cities where high efficiency arcs have been placed at close intervals. The fire department is efficient and will soon be provided with auto apparatus. The largest city park, Olentangy, contains a municipal theatre. Rapid transit facilities are good and the cars large and com-

HAYDEN BLOCK, TAR FILLER. SEVENTEEN YEARS OLD. COLUMBUS

fortable. A well managed asphalt repair plant is one of the comparatively recent municipal enterprises.

In the field of street paving the city showed its enterprise more than twenty years ago by being among the first to construct the two kinds of modern street paving which are practically American inventions—brick and asphalt. Pioneers in new enterprises are apt to acquire experience from which they and their neighbors profit afterwards. So it has been with Columbus. Some of the earlier pavements of both brick and asphalt were inferior in methods of construction to forms that have since developed. Even these, however, were serviceable, though some of them have been resurfaced, and they were the means of developing this superior class of work. Small brick and some of special shape led to the development of the paving block of standard size, and dry asphalt mixtures served to prove the value of richer ones.

About 25 years ago the principal paving material in Columbus was Medina stone block and this is still a favorite material for the heaviest traveled streets. The cost is so great, however, that the interest on the difference in price is great enough to pay for relaying a brick pavement by the time it would wear out on the same street. The accompanying table prepared by Chief Engineer Henry Maetzel gives the record for all kinds of paving laid from 1887 to 1910.

The details for the year 1909 were as follows:

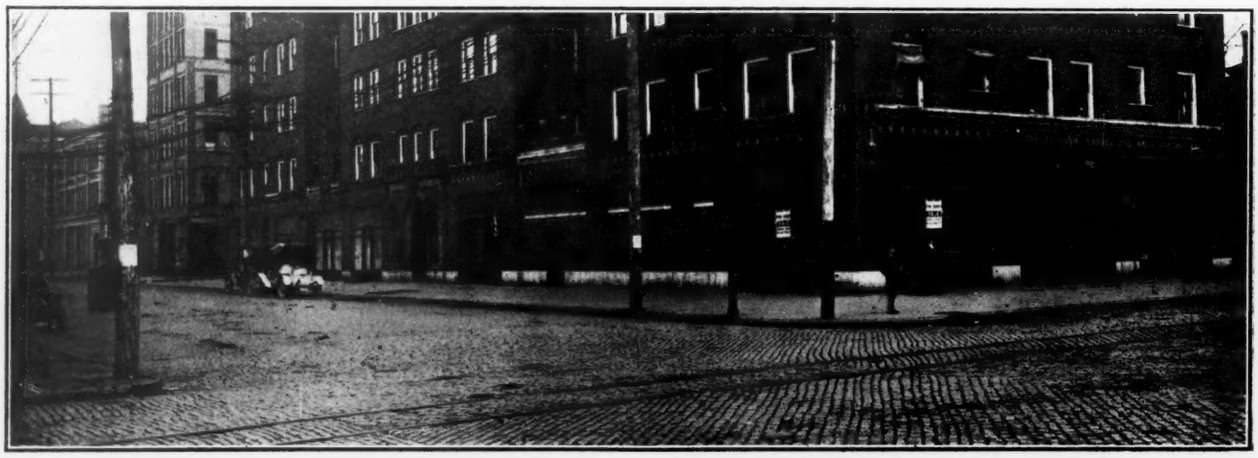
Pavement: All kinds, 19,652 miles, $641,979.34, total cost.
Asphalt: 1-in. binder, 2-in. topping, 26,205 sq. yds.; average price, $1.85.
Asphalt Resurface: 18,983 sq. yds., average price, $1.28.
Brick: Depth of sand cushion 1 in., 245,256 sq. yds. average price, $1.54.
Macadam: 1,557 cu. yds.
Average price per sq. yd. includes 6-in. concrete base, Portland cement, proportions 1-4-8.
Average price for grading, paid for separately, 40c. per cu. yd.
Guarantee on asphalt streets, 10 years.
Guarantee on brick streets, 5 years.
Guarantee on macadam streets, none.
Total thickness of pavements: Asphalt, 9 inches; asphalt resurface, 3 inches; brick, 11 inches; macadam, 14 inches.
Average price of straight curb, 45c. per lin. ft.
Average price of circle curb, 90c. per lin. ft.

(In connection with this subject it may be mentioned that the records of the engineer's office are kept in excellent shape although there have been no published reports for a good many years. The last report published was so detailed that

COLUMBUS, OHIO
Length of Streets in Miles Improved Each Year from 1887 to 1909

	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
El-O-So Asphalt														
Trinidad Asphalt	1.392	2.093	3.202	2.940	1.279	1.705	.563	1.413	.....	.178	.175	.....	.114	.....
Kentuck Rock Asphalt	.....	.....	.....	.819	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lime Rock Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.416	.....	.....	.....	.....	.....
American Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bermudez Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Trinidad Asphalt Resurface	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California-Cuban Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Asphalt Block	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Asphaltic Concrete	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Medina Stone	.577	2.084	1.957	.....	.....	.083	.....	1.553	.034	.181	.....	.....	.....	.082
Mt. Airy Granite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia Granite	.213	.666	.....	.185	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield Stone	.....	.163	.104	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hayden Block	.....	1.220	1.164	2.657	5.380	4.357	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous Brick and Block	.856	5.011	12.757	4.410	13.463	8.975	.861	.939	2.956	5.451	1.564	1.668	.837	.220
Boulders	.736	1.267	1.067	.....	1.326	.....	.....	.....	.....	.....	.....	.....	.....	.....
Macadam, Tarviated, etc	.....	.....	.....	.....	.....	.225	.....	2.108	1.879	.904	.169	.126	.209	.....
Totals	3.774	12.504	20.251	11.011	21.448	15.345	1.424	6.013	5.285	6.614	1.908	1.791	1.160	.302

	1901	1902	1903	1904	1905	1906	1907	1908	1909	Total Miles	Total Sq. Yd.	Total Cost
El-O-So Asphalt	.....	.....	.....	.....	.211	.632	.799	.071	.....	1.713	33,678	$96,390.05
Trinidad Asphalt	.267	.295	.284	.148	.....	.....	2.495	.429	1.823	20.795	399,041	1,083,957.90
Kentuck Rock Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.819	14,943	39,563.33
Lime Rock Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.416	7,932	21,027.42
American Asphalt	.234	.....	.....	.....	.....	.....	.....	.....	.....	.234	7,331	11,811.90
Bermudez Asphalt	.....	.....	.....	.....	.....	.173	.....	.....	.....	.173	3,208	6,893.78
Trinidad Asphalt Resurface	.....	.....	.....	.....	.....	.....	.....	.561	.510	1.071	75,825	152,265.30
California Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.237	.237	3,192	9,363.10
California-Cuban Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.394	.394	7,672	6,029.02
Asphalt Block	.....	.....	.....	.105	.....	.....	.....	.....	.....	.105	1,853	7,588.20
Asphaltic Concrete	.....	.....	.....	.....	.....	.....	.232	.438	.....	.670	8,055	20,771.04
Medina Stone	.....	.077	.045	.....	.....	.475	.....	.....	.....	7.148	128,604	496,216.50
Mt. Airy Granite	.....	.....	.....	.....	.....	.104	.095	.....	.....	.199	24,240	98,896.36
Georgia Granite	.....	.....	.....	.....	.....	.....	.077	.....	.....	1.141	40,390	173,818.88
Greenfield Stone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.267	5,282	19,087.66
Hayden Block	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.778	298,878	747,297.86
Miscellaneous Brick and Block	.689	1.243	1.091	1.760	4.249	9.256	6.622	23.289	15.869	123.936	2,268,169	5,067,495.60
Boulders	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.306	50,450	45,037.34
Macadam, Tarviated, etc	.....	.173	.572	.770	1.009	.....	.175	1.960	.819	11.098	.....	232,107.30
Totals	1.190	1.788	1.992	2.783	5.469	10.640	11.350	26.748	19.652	189.500	3,378,743	$8,335,618.54



FOREGROUND, MEDINA SANDSTONE LAID IN 1888. BACKGROUND, FIRE CLAY BRICK LAID IN 1888, COLUMBUS

the cost of the edition was $10,000. For reasons of economy the reports have since been omitted.) The table shows that in the early years a fair amount of stone pavement was laid, but that it has practically gone out of use in new constructions. Besides Medina, some Georgia granite has been used but the high freight rates and the abundant supply of an excellent and cheaper material have restricted its use. Asphalt figures in the total of 189 miles of paved streets to the exten of 13 per cent. During the first year of the record more asphalt was laid than any other paving material, and Columbus seems to have even yet a certain fondness for this paving material, at least for the best residence streets. The trials of many kinds of asphalt would seem to indicate a desire to find a variety which would compare in price and durability with brick, but the figures do not indicate any decided success. A colored map of the city in the engineer's office, however, does show a considerable area of asphalt in the east end, the best residence section in the vicinity of Broad street, the show street of the city, which is a wide, parked highway paved with asphalt, shown in one of the illustrations. In all probability it is as handsome a street in general appearance as any in the country.

But brick paving holds the unquestioned supremacy in Columbus; a position it has gained through its quality, durability and economy. From an insignificant beginning in 1887 of 6 per cent. of the total it has climbed up to the first place and in 1909 constituted 80 per cent. of all the paving laid during the year and 72 per cent. of all the existing paving laid during the 23 years which the record covers.

The paving situation in any city cannot be fairly considered apart from the question of supplies of raw material. Columbus is an inland city, without water competition in freight rates. The soil in that part of Ohio is heavy, with occasional beds of clay and shale, and some sand not usually free from clay, and there are strata of oölitic limestone. The city obtains its best sand from Lake Erie, shipments being made from Cleveland, Toledo and Sandusky, the latter city having the bulk of the trade. Bank sand can be obtained from other localities by rail, the best of it from the vicinity of Marion. Within the last few years a dredging company has operated a suction dredge on the Scioto river, which flows through the city, and supplied sand and gravel. Their company has an excellent plant for unloading material from barges and transferring it to wagons, and it plays an important part in the local market. Limestone, of a quality suitable for concrete, occurs at a number of points a few miles out of town. The hardest stone, however, comes from the vicinity of Marion. Columbus is favorably located with reference to the manufacture of cement. The mills at Cumberland, Md., supply a considerable quantity, and other mills in Pennsylvania and Ohio are not too far away to be shut out of the market. Clay and shale suitable for the manufacture of paving brick occur at a number of places and the competition of various varieties have been sharp. Athens, Nelson, Portsmouth and Canton supply a large quantity. Asphalt from the West Indies can reach the market via Atlantic coast points with a freight rate of about $4 a ton. The rate on California varies from $10 to $12 a ton.

ASPHALT PAVEMENT ON BROAD STREET, COLUMBUS

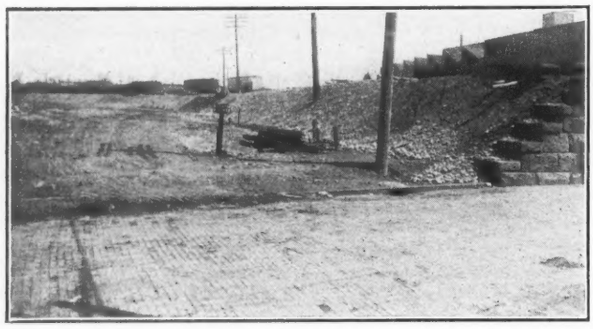
Tar for filling joints may be obtained from the Barrett Mfg. Company's plant in the city where a distillery, formerly owned by the Forest City Chemical Company, has been operated for many years. The company maintains special tank wagons and ships tar directly to the street for contractors who desire it. The tank is gauged before and after pouring, to determine the amount used, and the operation is simple and economical.

Construction methods as well as a good supply of excellent material have contributed to the pre-eminence of brick as the Columbus paving material. The engineer's specifications for all kinds of paving used in the city occupy 19 legal-sized pages of a printed form of fine type. They are complete and free

MAIN STREET, COLUMBUS, NATIONAL ROAD FROM CUMBERLAND, MD., TO RICHMOND, IND., PAVED IN 1890

from ambiguities. The Columbus method of laying brick pavement consists in laying a six-inch bed of Portland cement concrete and covering it with a one-inch cushion of sand. Upon this are laid 4-inch bricks and the joints are filled with tar. Pavements are guaranteed for five years.

In connection with the provision regarding paving, property owners are specifically given the right to remove and use any old material occurring in the street previous to paving. Rolling of the sub-grade is done by a roller weighing not less than 350 pounds per lineal inch of roller and the surface is rolled not less than three times. Several kinds of curbing are used; granite is used on some of the downtown streets, Medina on more, but Berea stone is the principal material. Com-



TAR-FILLED BRICK, LAID IN 1909. STANDARD CATCH BASIN. COLUMBUS

bined concrete curb and gutters are also used to a considerable extent on resident streets. Catch-basins are built by the paving contractors on new streets, and a very good form with cast iron inlet and trap is constructed for the low figure of $35. Concrete is mixed in the proportion of one part of Portland cement, 4 parts of sand or stone screenings and 8 parts of broken stone or gravel. As regards cement, the tests adopted by the American Society for Testing Materials are used as regards specific gravity, fineness, time of setting, strength, constancy of volume and composition. The broken stone includes sizes from 2½ to ½ inch. If the concrete is mixed by hand the sand and cement are first mixed dry. Some variation in the size of paving brick is allowed. The length may be from 8 to 9 inches, width 2¾ to 3¾ inches, depth 4 to 4½ inches. Edges are rounded ⅜ inch, the brick are molded with lugs or wide-spaced raised letters, 3/6 inch high, on one face. Bricks are subject to the rattler test of the National Paving Brick Manufacturers' Association, the rattler being 20 inches long and 28 inches in diameter, and revolving at a speed of 30 revolutions per minute for 60 minutes. Ten bricks makes a charge, and 300 pounds of cast iron foundry shot are put in the rattler. The shot are of two sizes, 1½ inch cubes and oblong pieces of 2½ inches square section and 4½ inches long. The loss must not exceed 18 per cent of the original weight. No test for absorption is specified. All bricks are laid at right angles with the curb, stretchers being used only at streets or alleys with center gutters. After ramming, the bricks are rolled with a roller weighing between 150 and 200 pounds per lineal inch. The coal tar paving pitch used in pouring the joints must have a melting point of not less than 130 degrees F. nor more than 140 degrees. It is poured at a temperature of 250 degrees. A top dressing of sand is spread over the pavement while the tar is still hot.

None of the Columbus contractors employs very extensive equipment in the construction of pavement except A. G. Pugh & Company, who have maintained an asphalt plant for many years. Luchtenberg & Company have used in grading, an Austin excavator and also a Thew steam shovel. The Austin excavator has given good results wherever large bolders or gravel were not found. The Thew shovel was used in excavating the earth for a street that was lowered in connection with the elimination of a grade crossing. The contractor speaks very favorably of the working of the shovel. It is specially commended for the accurate grading which it does and the even surface of the finished work, which requires very little trimming up afterwards. Bottom dump wagons are generally used. Long, low wagons have always been the type used in this section of the country, hence the Studebaker is a favorite, although Troy, Austin and other wagons are also used. Concrete mixers are generally employed in the foundation work, the Foote continuous mixer apparently being the favorite. Brick tongs are of course used in unloading cars, but conveyors are seldom seen in Columbus. This seems strange, as their cost is small and their economy beyond question.

One new paving material was used last year—Tarvia two-coat work—in which the hard limestone already mentioned as obtainable from Marion was used as road metal. From the excellent results obtained it seems likely that this may become a popular material in the outlying districts.

The municipal asphalt plant is one of the interesting Columbus enterprises, because the plant is an unusually good one, well adapted to the purpose and because it has been managed in an exceptionally able manner. Political considerations have not been allowed to hamper the management in the selection of employees. For a superintendent the city choose an experienced asphalt man, W. W. Horn, and the results justify the wisdom of their choice. The plant was built by Hetherington & Burner. It is substantially constructed of steel and concrete, is absolutely fireproof and is as nearly automatic in its operation as such a combination of machinery as can be. Four men can operate it and turn out all the material ordinarily needed for a single repair gang. While one street of 7,000 yards was being wholly resurfaced only nine men were required at the plant. The plant consists of a boiler engine, two seven-ton asphalt plants, on sand drier, one mixer, air pump, and the suitable elevators and accessories. The plant was described in our issue of March 3, 1909. In 1909 4,054 patches amounting to 10,247 yards were laid on 41 streets, the amount and cost of materials used being as follows: 1,619,100 pounds of sand, $647.64; 189,782 pounds asphalt, $2,277.50; dust, 224,875 pounds, $314.73; flux, 30,583 pounds, $257.83; cement, 2,695 pounds, $7.15; coal, 155,606 pounds, $120.52; labor, $3,554.59; miscellaneous, $643.62; total, $7,863.58.

The prices paid for material and labor were as follows: Asphalt, $24 per ton; limestone dust, $2.80; flux, $16.87; sand $.80; coal, $1.55; labor, $.22 2/9 per hour; foreman, $.40; engineer, $.30; rakers, $.27½; teams, $.40. The figures for the resurfacing job, on Eleventh avenue, comprising, 7,075 square yards, were as follows:

COST OF RESURFACING ELEVENTH AVE. WITH ASPHALT

Removing old asphalt and cleaning	$270.22	
7½ cu. yds. concrete stone	6.00	
6 cu. yds. asphalt sand, @ 80c	4.80	
8 barrels Alpha cement	9.50	
Labor on concrete and hauling materials	22.06	
Labor resetting curb	4.97	
Relaying 12 sq. yds. brick	8.00	
Total		$325.55

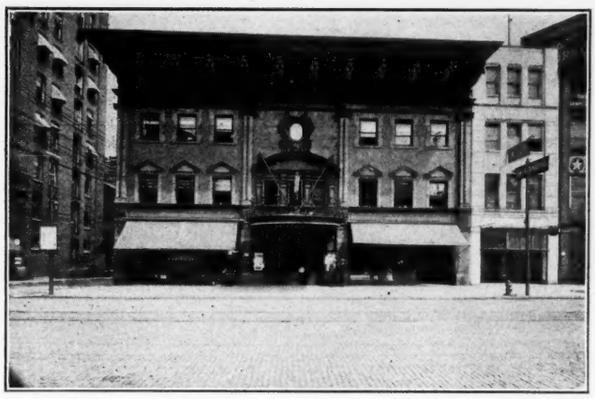
BINDER

282 cu. yds stone, @ $1	$282.00	
38,882 lbs. asphalt, @ $24	418.58	
6,209 lbs. asphalt, @ $16.87	52.29	
15 tons coal, @ $1.55	23.25	
Labor, plant and street	354.01	
Hauling	129.00	
Superintendence	40.00	
Total		$1,299.13

SURFACE

609 tons lake sand, @ 80c	$487.20	
132,889 lbs. asphalt, @ $24 per ton	1,594.60	
61 tons dust, @ $2.80	170.80	
24 tons coal, @ $1.55	37.20	
6 bbls. Louisville cement	4.50	
Labor, plant and street	661.74	
Hauling	217.80	
Superintendence	60.00	
Coal oil, waste, etc	3.22	
Total		$3,237.56

A Legislative bill has recently passed the house which is in effect a recognition of the success of the enterprise, and shows a desire in some quarters at least to further extend its usefulness. The bill is general in its provisions and would give to all Ohio cities the right to construct asphalt pavement by the day labor system under certain conditions de-



BRICK, TAR FILLED, LAID IN 1888. COLUMBUS

signed to secure reasonable prices and guard against the possible monopilization of the branch of a paving industry that might become demoralized by politics and consequently increase rather than decrease costs to property owners.

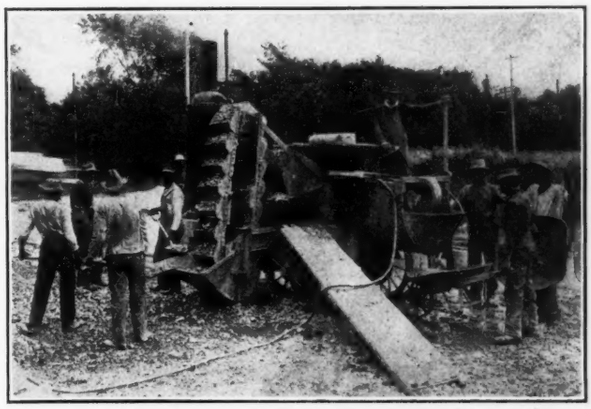
Columbus is essentially a brick-paved city, however, and will probably remain so. Their pavements differ from those in Cleveland chiefly in the use of bituminous filler. They have some cement-filled pavements, but object to them because of the noise; although the edges of the brick tend to chip and round more with the bituminous than with the cement filler.

PAVEMENTS ON OHIO STATE HIGHWAYS

THE State Highway Department of Ohio, which was organized in 1904, found a constantly increasing field of usefulness until, in 1909, by the aid of legislation increasing its authority and providing means of apportioning the expense, it was able to grant applications for the improvement of 53 roads in 36 counties. Contracts were entered into which amounted in the aggregate to $534,945, of which the State contributed $194,866, exclusive of engineering and inspection.

At first gravel and macadam were the only classes of construction. Macadam, however, has fallen into disrepute in the State, owing to its failure, as ordinarily laid, to meet present traffic conditions. It is stil an open question whether some comparatively new system of road construction will supply the need or whether the paving materials that have stood the test of time in city streets will prevail. The record of the last two years' work of the Highway Commission will show what the tendency has been in Ohio.

In 1908 the contracts let amounted to 25.69 miles of ordinary macadam and 7.17 miles of brick pavement. In 1909 the figures were 36.09 miles ordinary macadam, 5.57 miles of tar or asphalt treated macadam, and 20.45 miles of brick pavement. Incidentally it may be mentioned that the only increase in cost in the work done last year was met entirely by an automobile tax which amounted to $46,000. That the improvement of country roads with permanent pavements has met with general approval is evidenced by the fact that local county authorities have extended the improvements begun by the State entirely at their own expense. For instance, Portage county assumed $64,913 for the construction of over six miles of brick paved road, though the amount available from the State was but $10,586. Fifteen counties that did not construct State aid roads in 1908 built them in 1909, an increase of 15 per cent.



CONCRETE MIXER ON FOUNDATION WORK. COLUMBUS

According to the kinds of road-making materials available, Ohio naturally is divided into three sections. The central and southern parts of the west half of the State contain large quantities of good gravel and also a number of limestone quarries; the central and northwestern parts contain many large limestone quarries equipped with great crushing plants; the eastern part of the State from lake Erie to the Ohio river contain coal, gas, fire clay and shale, which make possible the

BRICK CONVEYOR ON OHIO STATE WORK

manufacture of the best paving brick at a minimum cost. Commissioner Wonders advises that the roads in each division should be constructed of the materials most easily available, and it is the road builders problem to manipulate the materials so as to obtain the best results.

For the purpose of aiding in the solution of these problems the State appropriated $10,000 for making a test of materials, particularly of dust preventatives and road preserving materials. A section 400 feet in length, 16 feet wide, was assigned for the use of each of the seventeen materials used, the whole forming a continuous road. Nelson avenue, east of the city of Columbus, extending north from Broad street to St. Mary's Academy, was selected for the experiments. Manufacturers of road preparations were invited by letters to participate in the work. The Highway Department paid for all labor and materials used in the work and each firm supplied an expert to superintentend the work in order that it should be done in accordance with the manufacturer's ideas. In addition to the sections constructed in this manner, a few sections were built using Portland cement as a binder, after methods worked out by the department. The following were the materials used:

Glutrin, a by-product in the manufacture of wood-pulp, manufactured by the Robeson Process Company of Au Sable Forks, New York. It is applied to the surface of a finished water-bound macadam road by a sprinkling wagon.

Standard Macadam Asphalt Binder, "a heavy product, almost solid asphaltum," manufactured by the Standard Oil Company. It is poured upon the top layer of the stone.

STATE WORK, SHOWING HEAVY CURB

Standard Asphalt Road Oil, "a manufactured product containing from 30 to 50 per cent. of petroleum asphalt;" manufactured by the Standard Oil Company. It is a surface treatment.

Pioneer Asphalt Cement, an asphaltic product mined in Utah by the American Asphaltum & Rubber Company of Chicago. It is applied to the top course.

Tarvia X, a coal tar preparation manufactured by the Barrett Mfg. Co. of New York. It is applied at a temperature of 250° to 300° F. to the top course as a filler by the use of compressed air.

Tarvia B, a coal tar preparation of "less tenacity and lower viscosity than 'Tarvia X'," also manufactured by the Barrett Mfg. Co. It is applied cold as a surface treatment.

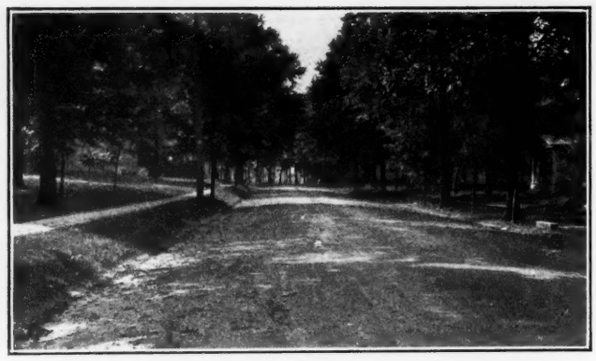
Liquid Asphalt, "a manufactured product carrying in solution 60 to 65 per cent. of asphalt fluxed with other constituents of a non-volatile nature." It is manufactured by the Indian Refining Company of Cincinnati and is a filler.

Taroid, "a coal tar pitch prepared in liquidized form as a binder," manufactured by the F. J. Lewis Mfg. Co., of Chicago.

Fairfield Refined Asphalt Cement, a product consisting of 88% bitumen and 12% mineral matter, manufactured by the Impervious Product Company of Baltimore. It is used as a filler.

Asphaltoilene, a product "equivalent to pure asphalt dissolved in petrolene," manufactured by the Good Road Improvement Company of Cincinnati. It is a filler.

Wadsworth Macadam, a new roadway on which Ground Kentucky Asphalt (containing not less than 8% Bitumen) is used as a top dressing. It is manufactured by the Wadsworth Stone & Paving Co., of Pittsburg.



EXPERIMENTAL ROAD. TARVIA TWO-COAT TREATMENT

Carbo-Via, a coal tar product manufactured by The Continental Bitumen Company of Toledo. It is used as a filler.

Road Coating, a tar preparation used as a bituminous binder. It is manufactured by the United Gas Improvement Company of Philadelphia.

Petrolithic Pavement, a process of treating a road with California asphaltic oil by means of the Petrolithic Rolling Tamper. It is constructed by The Petrolithic Pavement Company of Los Angeles, California.

Concrete Macadam, a process in which a grout of cement is rolled into the voids of an unfilled macadam road. Constructed according to plans and specifications prepared by the State Highway Department.

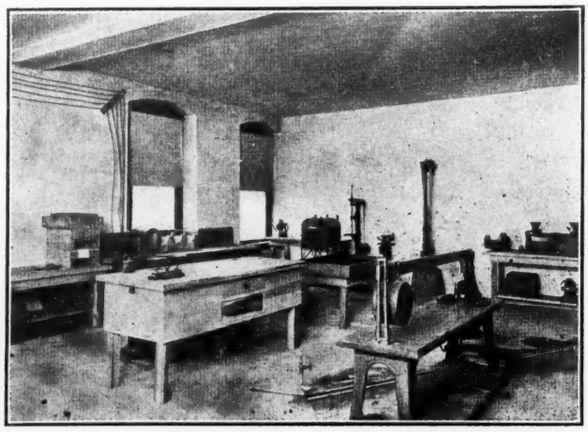
Gravel Concrete, a concrete roadway of gravel and cement. It will be built in accordance with ideas worked out by the State Highway Department.

Water-Bound Macadam, of which a section was built in accordance with the specifications of the State Highway Department.

Another line of experimental work conducted by the State will be carried on in a laboratory in the Ohio State University at Columbus. A room in the basement of Brown Hall has been equipped with about $5,000 worth of machinery, and here tests of paving brick and road stones will be conducted. The tests of road metal are for the purpose of determining the following properties:

Resistance to abrasion. The apparatus used for this experiment is the Deval machine, consisting of a series of four iron cylinders, in which a definite quantity of broken stone is placed. The cylinders are then fixed eccentrically on an iron shaft and the shaft rotated at a rate of 2,000 revolutions per hour. After 10,000 revolutions the stone and dust are removed. The ratio of material passing through a 16 mesh screen to the original weight represents the abrasion by which the different stone are compared.

Cementation test. This test requires more care and has to be conducted according to carefully prescribed conditions. Essentially it consists in making cylindrical briquettes from the powdered stone under examination, and subjecting them to the blows of an automatic hammer. The hammer falls one centimeter at each blow and the number of blows delivered before breaking gives the figure desired.



STATE HIGHWAY DEPARTMENT LABORATORY

BRICK PAVEMENT ON OHIO STATE ROAD

Toughness test. This is a hammer test of cylinders of stone, the tests being conducted on the same machine used in the cementation test, but operated in a different manner. By means of a series of electric contact points the hammer is raised one centimeter higher at each blow. The height from which the hammer falls at the breaking blow supplies the figure desired.

Resistance to crushing. This is performed by placing a cubical specimen on the steel platform of a testing machine and mechanically applying pressure by means of a cross head which approaches the test piece from above. The total pressure applied is determined by noting the number of pounds recorded by the balanced scale beam at the time of failure. This value divided by the area over which the pressure is distributed gives the crushing strength in pounds per square inch.

Hardness. This property is ascertained by revolving a sample of the stone on a circular track or bed of emery. The proportion of dust ground off under uniform conditions is the measure of hardness.

Absorption. A definite weight of thoroughly dried stone is immersed in water and the increase in weight in 96 hours noted.

The laboratory also contains appliances for testing brick according to the standard tests of the National Brick Manufacturers' Association. In conection with this the department is about to co-operate with this association in an effort to improve the rattler employed in the abrasion test. Experiences during the past nine years since the standard rattler was adopted has demonstrated that it is necessary to modify the specifications for this in order to obtain satisfactory and uniform results. As a first step toward this a new rattler has been designed, or rather one with slight modifications and built after more rigid and definite specifications, and duplicates are to be used by the association and the Columbus laboratory during the next few weeks. One thousand brick, all from the same kiln, all as nearly alike as experts can obtain them, will be tested, 500 at Columbus and 500 at Indianapolis by the Brick Manufacturers' Association. One object of this is to determine whether the tests at two laboratories by entirely different men would produce similar results. Incidentally, it is intended to try the effect of round shot rather than the cubical and other shapes heretofore employed.

RESURFACING ROADS IN EAST ORANGE

THE city of East Orange, N. J., during the year 1909 resurfaced 67,160 sq. yds. of road with 1½-inch stone, using sand as a binder, at a total cost of $18,913.06. The average cost of 1½-inch stone and screenings 4 inches thick was 20.1 cts. per sq. yd.; the average cost of sand, 2.1 cts. per sq. yd.; average cost of coal, 0.1 ct. per sq. yd.; average cost of scarifying, 0.3 ct. per sq. yd; average cost of rolling, 1 ct. per sq. yd., and average cost of labor, 4 cts. per sq. yd.; a total of 27.6 cts. per sq. yd.

The city also treated with oil and screenings 52,070 sq. yds. of road at an average cost of 5.8 cts. per sq. yd.; the average cost of screenings ¾-inch thick being 2.5 cts. per sq. yd.; average cost of labor in preparing road, oiling, rolling, and coal, 1.8 cts. per sq. yd., and average cost of oil, 1.5 cts. per sq. yd. The amount of oil used was 0.4 gallon per sq. yd.

Other sections of road to the amount of 4,650 sq. yds. were resurfaced with 1½-inch stone, using a heavy oil as a binder, at an average cost of 45.7 cts. per sq. yd. The average cost of the 1½-inch stone and the screenings was a little over 23 cts. per sq. yd.; average cost of scarifying, 0.4 ct. per sq. yd.; average cost of oil, 10 cts. per sq. yd.; average cost of rolling, 0.2 ct. per sq. yd., and average cost of labor, 12 cts. per sq. yd. The amount of oil used averaged 1 2/3 gallons per sq. yd. The labor item in this case, 12 cts. per sq. yd., was unusually high owing to the fact that it was the first work of this kind which the city has done and some difficulty and delay were at first experienced in the distribution of the oil.

For the above information we are indebted to Mr. Frederick A. Reimer, City Engineer of East Orange.

DETROIT MUNICIPAL ASPHALT PLANT

By LEN G. SHAW

DETROIT'S municipal asphalt plant has been in operation six years, and although from the outset there has been a handsome saving by the city, last season was by far the most profitable in the history of the enterprise. Asphalt Expert Clarence A. Proctor, in direct charge of all work of this nature in Detroit, under Public Works Commissioner Jacob J. Haarer, has just completed his annual report, showing that, on the 254,845 square yards of resurfacing, repaving and patching done by his department during 1909, the city saved $50,433.40. Furthermore, in computing the estimated saving Mr. Proctor took the lowest average contract price prevailing during the first five years the plant was in operation. These figures were materially lower than those prevailing last season, so that in reality the saving to the city by doing its own work was considerably more than appears in the report.

The amount of work done last year was 254,845.45 square yards, an increase of more than 61,000 square yards over the record of 1908. A total of 572,000 square yards had been laid by the plant in the previous five years. The total cost of asphalt pavement laid by the city during the six years the plant has been in operation is $873,331.32, and the saving effected in that period taking the lowest average contract price as a basis of computation, is $133,349.81.

COSTS, TOTAL AND PER YARD, OF RESURFACING, REPAVING AND PATCHING IN DETROIT

	Total Sq. Yds. Laid, 1909	Total Cost	Cost per Yard, Labor and Material	Overhead Charges	Total Cost per Yard Exclusive of Maintenance	Credits	Net Total Cost Exclusive of Maintenance	Net Cost per Sq. Yd. Exclusive of Maintenance
Resurfacing	198,559.00	$182,098.46	$.8541	$.063+	$.9171	$7,446.61	$174,651.85	$.8796
Repaving	20,369.70	17,760.34	.8089	.063+	.8719	1,712.97	16,047.37	.7878
Patching	35,916.75	35,672.52	.9302	.063+	.9932	4,147.48	31,525.04	.8777
	254,845.45	$235,531.32				$13,307.06	$222,224.26	

	Ten Years' Maintenance Estimated Reserve 20c. Yd.		Total Cost, Sq. Yd.	Total Cost to City	Lowest Average Contract Price	Total Contract Price	Estimated Saving to City
Resurfacing	*171,016.70	$34,203.34	$1.0518	$208,855.19	$1.23	$244,227.59	$35,372.38
Repaving	20,369.70	4,073.94	.9878	20,121.31	1.30	26,480.61	6,359.30
Patching	†		.8777	31,525.04	1.12	40,226.76	8,701.72
	191,386.40	$38,277.28		$260,501.54		$310,934.94	$50,433.40

* 29,542.30 yards laid for Park and Boulevard Commission and to be maintained by them. † No maintenance on patching.

Material, of course, constituted the chief item in the year's expenses, amounting to $145,991.27. Labor at the plant involved an expenditure of $24,237.64, that on the streets $69,841.81, and teaming $18,959.50.

In spite of the fact that the price of raw asphalt advanced materially last year, the cost of paving was less than the average price for the five preceding years, the comparison being as follows:

	1909	5 years previous
Resurfacing	$1.05118	$1.14426
Repairing	.9878	1.05178
Patching	.8777	.91174

In considering these figures the amount of material used must be borne in mind, the repaving and resurfacing consisting of a 1½-inch binder and a 2-inch topping compacted, while patching averages 3 inches, mostly topping. It will also be noticed that the cost of the plant, which represents an investment of $46,846 to date, is checked off each year at the rate of 10 per cent, which is included in the operating expenses and very properly becomes a part of the cost of this work to the city.

For the purpose of comparison, the detailed report of operations for 1909 is appended herewith, the figures providing interesting study.

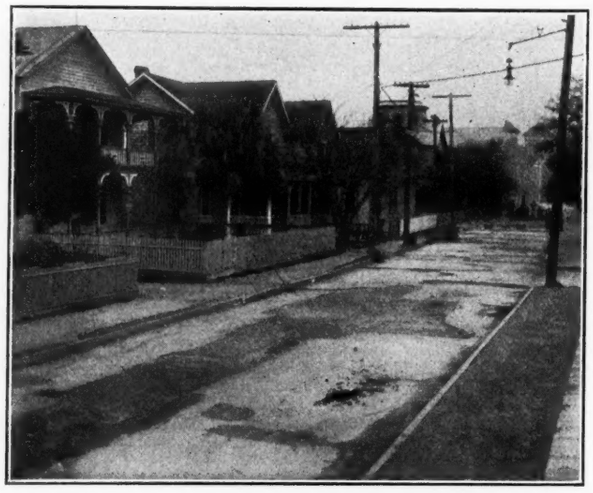
Operating Expenses—		
Salaries, expert and assistants	$ 5,700	
Repairs and renewals	4,614.41	
Sundry expense items, including oil	1,059.55	
	$11,373.96	
Estimated depreciation on capital investment (10 per cent. on $46,846.47)	4,684.65	
Total operating expense	$16,058.61	
Credits—		
Received for patching for sundry corporations and departments (5,481.29 sq. yds)		$ 8,048.16
Cost to city		5,436.29
		$ 2,611.87
Old boiler sold	45	
Mixture sold	1,418.41	
Empty barrels	1.20	
Asphalt cement	.50	
Use of rollers	70.50	1,535.61
Repairing and resurfacing for contractors and park and boulevard department		9,159.58
Total credits		$13,307.06

ASPHALT REPAIRING IN ST. AUGUSTINE

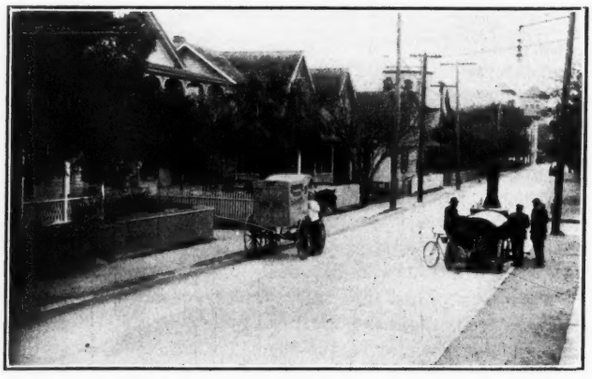
Although quite a number of the streets of St. Augustine, Fla., are paved with asphalt, there has been no plant available for repairing these for several years past, and it has been the practice to patch the holes which have appeared from time to time with brick. During this winter, however, the city has been repairing these streets itself with a portable asphalt repair plant, furnished by Robert Hooke of Chattanooga, having begun the work on November 1st and continued it up to about February 1st of this year. The total number of square yards of patches was 4,290, these being in small patches on several streets, the square yards on each of the several streets being: 96.82, 228.3, 936.1, 390.3, 269.8, 152.7, and 1,344.9. Over 31,000 brick had been used in patching these holes, and these were removed and used in paving another street. Asphalt cement was obtained from the Texas Company of New York, sand from Capo & Drysdale and cement from Canfield & Sons, both of St. Augustine.

For ten days at the beginning of the work Mr. I. M. Eversole, an employee of the Board of Public Works of Chattanooga, Tenn., instructed local workmen and foremen in the best methods of conducting the work, after which it was placed in charge of Mr. Alvin Drysdale. In order to expedite the work the city employed two men to report on the work one hour earlier than the others, in order to have the first cooking of sand thoroughly dry before the remaining force arrived. This enabled them to prepare five cookings instead of four in an eight-hour day; in other words, the extra hour each day of these two men permitted the laying of twelve additional yards of patches per day, or in round figures about 1,000 yards of additional patching during the period over which the work extended, which was 83 days. The force employed on this work consisted of eight men; one foreman at $4 per day, four men to operate the plant at $2 per day, two men for cutting away the old asphalt at $1.50 per day, and one teamster with a team to serve as supply wagon and to remove the old asphalt, etc., at $2.50 per day. The pressure at which the work was carried on overtaxed the plant to the extent of burning holes in the pan, the repairing of which cost $127.41; which repairs are included in the cost of the work given below.

The repair plant cost $537.00, and the total cost of the work was $3,425.77. In addition to the 4,290 square yards of asphalt surface, which cost an average of 56.67 cents per sq. yd., 1,270 sq. yds. of concrete foundation was laid, at an average cost of 78 cents per sq. yd. The cost of removing the brick patches and relaying brick along the railway track is included in the cost per sq. yd. of replacing the concrete base. The average cost per sq. yd. of the whole work was 79.84 cents.



BREAKS IN OLD CORDOVA STREET PAVING, ST. AUGUSTINE



SAME PAVEMENT REPAIRED

Prior to repairing the streets with this plant, almost every material available had been tried, but unsuccessfully. Miami rock, which is very adhesive and makes splendid roadways, was tried, but would not bond with the concrete or asphalt. Concrete was then tried, but with the same result. About a year ago the city removed the foundation on several streets where the holes were very bad and put in brick, but this was not satisfactory as the brick settled out of surface. Hon. Eugene Masters, Mayor of St. Augustine, to whom we are indebted for this information, states that the patching done with this portable repair plant has been most satisfactory, enabling the city to restore the streets to the condition they were in fourteen or fifteen years ago; and the repairing of the asphalt pavements is highly appreciated by the citizens generally.

The credit for undertaking this work and for adopting the methods which were employed is due largely to Mayor Eugene Masters; and the carrying out of the repairing was in the charge of the Mayor and the members of the Committee on Streets and Lanes, consisting of Aldermen E. W. Howatt, J. A. Usina and W. T. Green.

SMOOTH GRANITE BLOCK PAVEMENTS

Laid Last Year in Newark, N. J.—Difficulties Encountered in Obtaining Granite Blocks to Meet Specifications —New and Old Specifications—Other Cities—Cost of Work—Location of Quarries

By W. A. HOWELL, Engineer, Department of Streets and Highways, Newark, N. J.

The feature of the paving work of 1909 in Newark, N. J., was the introduction of the new form of close-jointed, heavily grouted granite block pavements. For several years there had been an earnest effort on the part of municipal engineers to produce a better grade of granite block pavement. In December, 1908, the writer was a member of a visiting delegation from Newark to inspect the Hassam-grouted, granite block pavements of Worcester, Massachusetts. We were greatly interested, and agreeably surprised at the smoothness of the pavement and the excellence and durability of the grouting. In May, 1909, the writer also visited Troy, New York, where a similar pavement to that laid in Worcester was under construction, a portion of the same street having been paved in the same way during the fall of 1908. The city engineer assured us that during the winter of 1908-09, the grouting on the surface of the blocks, and in the joints between the blocks, prevented horses from slipping, there being sufficient grit in the grouting to do this. Engineer Grimes stated that during the entire winter referred to no horses had fallen on this street, although on adjacent side streets laid with asphalt horses had been falling continually.

Our new granite specifications for 1909 called for blocks from 7 to 12 inches long, from 3½ to 4½ inches wide, and from 5¾ to 6½ inches in depth.

The specifications in full were as follows:

SPECIFICATIONS FOR GRANITE BLOCK PAVEMENT, HAVING CLOSE JOINTS GROUTED WITH CEMENT, 1909

A.—Each block shall measure on its base or upper surface not less than seven (7) inches nor more than twelve (12) inches in length and not less than three and one-half (3½) inches nor more than four and one-half (4½) inches in width and not less than five and three-quarters (5¾) inches nor more than six and one-half (6½) inches in depth.

These blocks when laid in the pavement shall give an approximate average of thirty (30) blocks to the square yard.

The blocks must have such uniformly plane surfaces and without bunches and depressions so that when several blocks are laid adjoining each other there shall be no opening or space between the blocks which will exceed three-eighths (⅜) of an inch. Preference will be given to blocks which may be made from granite of such a uniform texture that the above requirements regarding rectilinear faces may be obtained by splitting without the necessity of tool work, the object being to obtain not only close side and end joints, which must not be more than three-eighths (⅜) of an inch, but also to obtain a pavement in which the surface of the block will wear uniformly flat and not "turtle-back."

B.—Each bidder must submit before or at the time of making his bid at least ten (10) samples of the block on which he is bidding or refer specifically to samples heretofore submitted, and must also name the quarry from which he will obtain his blocks, and the character of the block submitted with his proposal or referred to in the same as regards the quality of the material, the uniformity of the surfaces of the block and the absence of the necessity of tool work will be taken into consideration in awarding the contract; and for the contract, when awarded, the samples submitted by the bidder or referred to in his proposals upon which the award of the contract has been based, will be the standard to which the blocks delivered on the work must conform.

C.—The blocks shall be neatly piled on the sidewalks and cross streets. Openings shall be left so as to enable property owners to use the street and the piles shall be kept at least six (6) feet from all fire hydrants. The work shall be so arranged and the distribution so made that blocks shall not be piled on the street for more than two (2) weeks before being laid, but no part of the street shall be excavated unless the materials for paving are on the line of work, except by permission of the Chief Engineer.

D.—The pavement is to be laid on a concrete foundation and the stone blocks are to be bedded on a cushion of sand and as heretofore described. The blocks shall be stiffened by sprinkling screened pea stones over the surface, which shall be swept into the joints with a wire broom. The screened pea stones shall, however, be only broomed into the joints just sufficient to hold the stones firmly in position during the ramming and until finally grouted. The blocks shall then be rammed to a uniform bearing true to the established grade and crown with a uniform surface; after the first ramming the blocks may be brought to a uniform surface by rolling with a steam roller weighing not less than five (5) tons. All stones which settle below the grade line shall be raised or taken up by the person ramming, and reset with sufficient sand beneath and again rammed until they are brought to a uniform surface and unyielding bed. Any blocks which are broken by ramming must be replaced by other blocks. Before the pouring of the cement grout hereinafter provided for the joints between the paving blocks must be cleaned out to a depth of three (3) inches from the top, unless such a small amount of screenings has been left in the joints as not to interfere with the penetration of the grout to the bottom of the stone blocks.

The stones will be carefully inspected after they are brought on the line of the work, and all blocks, which, in quality and dimensions, do not conform strictly to these specifications will be rejected, and must be immediately removed from the line of work. The contractor will be required to furnish such laborers as may be necessary to aid the inspector in the examination and culling of the blocks; and in case the contractor shall neglect or refuse to do so, such laborers as in the judgment of the Chief Engineer may be necessary, will be employed by said Chief Engineer, and the expense thus incurred by him will be deducted and paid out of any money then due or which may thereafter become due to the said contractor under this agreement. The blocks shall be furnished and distributed generally throughout the street so as to produce non-uniformity in the length of the stones, and the stone blocks of the same thickness shall be piled by themselves as nearly as may be upon the line of the work in order that the laying of courses of uniform widths may be facilitated.

E.—After the ramming and rolling Portland cement grout shall be poured into the joints until it appears on the surface. The grout shall be broomed into the joints, if necessary to fill the same, and the operation must be continued as the grout settles until the joints are thoroughly filled flush with the surface of the blocks, after which the entire pavement shall be broomed to a smooth surface. The blocks shall be wettened by sprinkling immediately before applying the grout if the condition of the atmosphere requires this precaution to be taken. The grout must be mixed with a suitable apparatus in which the mixture of sand, cement and water are continually agitated, immediately preceding and during the process of pouring. To obtain satisfactory results with the grout it would seem essential that some form of mechanical agitator should be used and if found necessary to obtain satisfactory results, such a method of handling the operation of grouting must be employed.

The cement grout shall be composed of one or more measures of the best quality of freshly burned Portland cement to not to exceed two measures of clean sharp sand. The mixture to be employed for any piece of work shall depend upon the hardness of the granite used, and this mixture shall be ascertained by sufficient experiments to give a grade which will be of such a strength as to wear down uniformly with the granite used. In the mixing of the cement and sand clear water shall be used to give the proper consistency. After the grouting is completed the streets shall be kept closed and no carting or traffic allowed until eight (8) days have elapsed on any portion of the street grouted, and the face of the pavement shall be kept moist if the condition of the weather requires this precaution. The contractor shall erect sufficient and well-constructed barricades and furnish watchmen at all times if the same shall be necessary to insure that this precaution in regard to the prevention of traffic or carting is complied with. Should the bond between the blocks become broken for any reason, the joints at such places shall be cleaned out, even if it be necessary to take up and relay the blocks, and such parts so taken up and relaid shall be regrouted and rebarricaded.

F.—If the contractor for the work desires to lay the concrete foundation by a satisfactory method of applying grout mixed by a mechanical agitator to broken stone laid on the subgrade and demonstrates to the satisfaction of the Chief Engineer that a better concrete foundation can be obtained by this method, such a construction of a concrete foundation will be allowed; the ingredients to be in the same proportions as required for the ordinary method of mixing concrete.

The first granite blocks laid in Newark under these specifications were laid by the Public Service Corporation in the Broad Street tracks. The material used was mostly from the Long Cove Quarries, Maine. Although these blocks were not grouted, tar and gravel filler being used, the general public at

once realized the tremendous advance made in this form of paving. The smoothness of the surface of the pavement in the tracks, contrasted with the old style granite block pavement laid between the tracks and curb on the same street, was very noticeable. This track pavement was laid under city supervision, and the good results attained were secured only by the most rigid inspection and untiring efforts on the part of Mr. Charles A. Stilger, principal assistant engineer. The shipments of blocks for this work, and for the paving of six other streets, the contracts for which were awarded during May, 1909, made it very evident that a campaign of education was absolutely necessary, both at the quarries among the block makers and on the street among the pavers.

In Worcester and Troy no attempts had been made to get a closer joint than one-half inch, the prevailing joints being nearer ¾ inch in those cities. In Newark we went much further. We reduced the thickness of the joint to ⅜ of an inch in our specifications and insisted in carrying it into effect on the ground. In Worcester and Troy the principal object aimed at in the work was to get a hard, durable, smooth grout that would last at least three or four years.

The granite people having claimed that our specifications were impracticable in so far as they referred to the 3/16 of an inch deviation from a straight edge, on all of the sides of the paving block, especially "the double header" requirement (the bottom of the block to be as near a true plane surface as the head of the block). Mr. James C. Hallock, assistant to the Chief Engineer, and the writer were sent to the quarries in Maine and Massachusetts, from whence the material used in Newark had been received, to study the situation on the ground. On September 1st we visited the Cape Ann quarries of the Rockport, Massachusetts, Granite Co., owned by Mr. Rogers, and on the next day we inspected the Long Cove quarries of the Booth Brothers and Hurricane Island Granite Company in Knox Co., near Rockland, Maine. We found upon investigation at both of the quarries that only about 5 to 10 per cent of the block makers were capable of turning out the "Newark blocks," these men having received an immediate advance of $7 per thousand in wages for the new work. The Rogers people claimed that where a block maker under the old requirements could turn out 150 blocks in eight hours, under the Newark specifications, he could not make more than 75 blocks. We decided to report on our return to Newark recommending that the specifications be modified so as not to require the 3-16 maximum deviation from a straight edge on all of the sides of the blocks. The first thing we noticed at the quarries was that every block had at least one smooth surface suitable for the head of the block. One of the first essentials in granite block paving is the ability of the paver to be able to distinguish the "head" of the block at first glance. I find upon inquiry among paving contractors that probably as many as 30 per cent cannot unerringly select the head part of the block.

The blocks from the Cape Ann or Rockport, Massachusetts, quarries were to be laid on Christie Street, Thomas Street and Orange Place, Newark. The material was a hard granite, coarse-grained medium light blue in color. The blocks from Long Cove Maine, were to be laid on Arlington, Augusta and Main Streets. This granite is fine-grained, hard, light blue. The first shipments of Cape Ann blocks received on Christie Street were so utterly outside our new specifications that we were under the impression that a cargo intended for Baltimore had been shipped to Newark by mistake. Clippers were put on the blocks in an endeavor to dress them to meet the specifications; but it was finally decided, after much time and money had been expended, to remove the entire shipment and use the blocks on a private job, where the new specifications were not required. We were exceedingly doubtful, at this time, of the ability of the Rockport Granite Company to meet our new specifications, especially on end joints. But the Rogers' people sent another shipment, and unloaded the cargo on the dock, and had clippers dress the blocks before they reached the street at all. A small section of the street was then paved with the clipped blocks, say about 30 feet in length. The blocks were inspected with the greatest care, and the contractor was able to produce, with this coarse-grained granite, a pavement made up of blocks with practically every joint not exceeding ⅜ of an inch, and many joints not over ¼ of an inch. The same experience was gone through with in laying the pavements on Arlington, Augusta and Main streets; although, the granite being finely grained, it was really less trouble to have these blocks meet the specifications than in the case of the Cape Ann blocks.

PAVING WORK AWARDED DURING 1909 IN NEWARK, N. J.

Calling for close-jointed, heavily-grouted granite block pavements on a 6-inch concrete foundation:

Name of street.	No. of sq. yds.	Price bid per sq. yd.	Quarry where material came from.	Owner of quarry.
Arlington st.....	4,100	$3.07	Long Cove, Knox Co., Maine.....	Booth Brothers
Augusta st.....	650	3.07	Long Cove, Knox Co., Maine.....	Booth Brothers
Main st.....	6,580	3.07	Long Cove, Knox Co., Maine.....	Booth Brothers
Christie st.....	4,300	3.07	Rockport, Mass. (Cape Ann).....	Rogers Brothers
Orange pl.....	650	3.07	Rockport, Mass. (Cape Ann).....	Rogers Brothers
Thomas st.....	5,000	3.07	Rockport, Mass. (Cape Ann).....	Rogers Brothers
Prospect st.....	1,700	3.00	Chester, Mass.....	J. Leopold & Co.
Fifteenth ave...	9,500	3.09	Chester, Mass., or Vermont quarries	J. Leopold & Co.
Division pl.....	1,100	3.20	Long Cove or Cape Ann	Booth Bros. or Rogers Bros.
Division st.....	750	3.15	Concord, N. H.....	Hen'y M. Potter
Cross st.....	800	3.14	Concord, N. H.....	Hen'y M. Potter
Bloomfield ave...18,000		3.09	Concord, N. H.....	Hen'y M. Potter
South Canal st..	2,700	3.01	Chester, Mass., or N. H. quarries...	J. Leopold & Co.

Total yardage awarded, 55,830. Average price per sq. yd., $3.08.

The result of our year's work on the new granite paving would at first glance seem rather disappointing. We succeeded in laying but 17,835 square yards out of 55,830 square yards awarded. On the other hand we feel confident that the campaign of education which we have inaugurated, will produce better results in 1910. The quarry people know exactly what is expected of them, and in their turn will get better results from the block makers. The pavers will do better work this year also, as they already appreciate the improved appearance of this form of pavement and are rather proud of their share in putting it in place.

At the recent conference held at the Hotel Belmont in New York City, at which the adoption by first class municipalities of standard specifications for granite block pavements was discussed, it was voted to recommend the following points as *standard,* the same to be brought to the attention of the Chicago Convention which was held from February 21 to 26: The length of the block should be from 8 to 12 inches, the width from 3½ to 4½ inches and the depth 5 inches. A joint not over ½ inch was recommended, and the maximum deviation from a straight edge on the head of the block was placed at ⅜ of an inch.

It is interesting in this connection to give some figures as to dimensions of blocks and prices obtaining in Newark during the past 27 years. Mount Prospect Avenue was paved in the year 1873, with a granite block about 7 inches square, at $2.87. The blocks were laid on a sand foundation and the yardage was 11,700. Market Street from the Court House to the Pennsylvania Railroad was paved in 1883 at $2.40 per square yard. This was considered the finest granite paving job in Newark at the time of completion. Mechanic Street (a heavy traffic street), was paved with granite blocks on a six-inch concrete foundation, the concrete being 1:2:4, at a cost of $3.76 per square yard. The highest prices paid for granite block pavements in Newark were paid in 1872 on two sections of Halsey Street north and south of Market Street. On one section amounting to two short blocks the price was $3.93 per square yard and on the other section amounting to one short block the price was $3.50 per square yard. These pavements were on a sand foundation.

The Specifications Under Which the Above Mentioned Work Was Done Were As Follows:

SPECIFICATIONS (1883) FOR MARKET STREET GRANITE BLOCK PAVEMENT

The granite blocks are to be of durable and uniform quality, each measuring on the face or upper surface not less than 10 nor more than 13 inches in length, and not less than 3½ inches or more than 5 inches in width, and in depth not less than 7 nor more than 9 inches. No blocks shall be more than 1 inch less in width or length on the base than on the face. All blocks which in quality and dimensions do not conform to these specifications will be rejected and must immediately be removed from the line of the work. (Cost $2.40 per sq. yd., on sand foundation.)

SPECIFICATIONS (1893) FOR MECHANIC STREET, GRANITE BLOCK ON CONCRETE FOUNDATION

The oblong granite blocks, are to be of uniform quality, equal in hardness to what is known as Quincy granite. They must show no lamination or stratification, and be free from an excess of mica or feldspar. Soft or weather-worn stone, obtained from the surface, or sap of the quarry, will not be accepted. The blocks must be equal in quality and measure on the upper surface or face, not less than 8 inches nor more than 14 inches in length, and not less than three inches nor more than 4½ inches in width; the depth to be not less than 7 nor more than 9 inches (8 inches preferred). The blocks shall not be more than one inch less in width or length at the base or bottom, than they are at the top, and the sides and ends shall be dressed so they will make close fitting joints; no knobs or projections on the ends and sides to measure more than ½ inch. All blocks not conforming to these requirements will be rejected. (Cost per sq. yd., $3.76, on 6-inch concrete mixed 1:2:4.)

OLD FORM OF SPECIFICATIONS, 1908

The blocks shall be equal to the best quality obtained from "Blue Hill" in Maine, Westerly in Rhode Island, Millston in Connecticut, or Cape Ann in Massachusetts; the blocks must be uniform in quality, as to color, grain and hardness, show no laminations, and be free from an excess of mica or feldspar. Soft or weather beaten stone, obtained from the sap of the quarry will not be accepted. The blocks must have fair and true surfaces on all sides they must be split and dressed so that they can be laid with close end joints and side joints not exceeding one-half (½) of an inch. All blocks whose side faces vary more than one-half (½) of an inch from a rectangular shape will be rejected. The blocks must measure on the face or upper surface not less than 3½ nor more than 4½ inches in width, not less than 8 inches nor more than 12 inches in length, and not less than 7 or more than 8 inches in depth, unless otherwise specially called for. The base or lower surface shall not be less than one-half (½) inch in width and length than the upper surface.

The prices prevailing during the past five years have been as follows:

GRANITE BLOCK PAVEMENTS ON CONCRETE FOUNDATION

Concrete 6 inches thick; mixed 1:3:6

Year.	Square yards.	Filler.	Average cost per sq. yd.
1905	20,619	Tar and gravel	$2.78
1906	3,465	" "	2.78
1906	833	Portland cement Grout	2.78
1907	37,184	" " "	3.05
1908	33,935	" " "	2.95
1909	17,835	" " "	3.08

GRANITE BLOCK PAVEMENTS ON SAND FOUNDATION

Year.	Square yards.	Filler.	Average cost per sq. yd.
1905	27,290	Sand	$2.03
1906	6,478	Trap rock screenings	2.02½
1907	3,677	Sand	2.05

In conclusion the writer would take this occasion to testify his appreciation of the splendid work of Messrs. Sherrerd, Tillson and Rust (all past presidents of the American Society of Municipal Improvements), in bringing about the recent improved form of standard granite specifications.

LIST OF THE PRINCIPAL GRANITE QUARRIES OF NEW ENGLAND ALONG THE COAST

Connecticut—Millston Point, Henry Gardiner; fine grain, hard, dark color.

Connecticut—Millston Point, Connecticut white granite, Booth Brothers,, fine grain, hard, light color.

Rhode Island—Westerly, New England Granite Works; white, fine grain, hard, and also red, coarse grain, hard.

Rhode Island—Westerly, Smith Granite Works; white, fine grain, hard, and also red, coarse grain, hard.

Rhode Island—Westerly, Sweeny Granite Works; white, fine grain, hard, and also red, coarse grain, hard.

Massachusetts—Quincy (there are 25 or 30 quarries under the name of Quincy); coarse grain, hard, very dark color.

Massachusetts—Rockport, Cape Ann Granite, Rogers Brothers (two quarries); coarse grain, hard, medium light.

Massachusetts—Rockport, Cape Ann Granite, Pigeon Hill Granite Co. (one quarry); coarse grain, hard, medium light.

Maine—St. George, Knox County, Booth Brothers and Hurricane Island Granite Co.; fine grain, hard, light blue.

Maine—A group of islands (High Island, Spruce Head, etc.), Messrs. Gray & Sons, Philadelphia, and The Bodwell Granite Co. own all of the quarries on these islands; fine grain, gray, hard.

Maine—Fox Island, Hurricane Island, Vinal Haven, Deer Island, Blue Hill. Hurricane Island and part of Vinal Haven quarries belong to Booth Brothers; coarse grain, gray, medium hard. (Note.—Part of Vinal Haven turns out a very fine grain similar to Westely.)

Maine—Sullivan-Hancock County; fine grain, hard, light color.

Maine—Jonesport; coarse grain, hard, red stone.

Maine—Jonesboro; fine grain, hard, red stone.

Maine—Red Beach; fine grain, hard, red stone.

IN THE INTERIOR OF NEW ENGLAND

Massachusetts—Chester; fine grain, light color, hard.

Massachusetts—Milford; coarse grained, pink, suitable only for buildings.

Massachusetts—Chelmsford; fine grain, white, soft.

New Hampshire—Concord, Keene; fine grain, white, soft.

New Hampshire—Marlboro, Troy. (Mostly used for buildings; paving blocks made at all of these quarries, however.)

Maine—Waldoboro; fine grained, white, soft.

Maine—Hallowell; fine grained, white, soft.

Maine—North Joy; fine grained, white, soft.

Vermont—Barre; fine grain, blue, hard stone.

Vermont—Bethel, etc.; fine grain, blue, hard stone.

REDRESSING GRANITE PAVING BLOCKS

Repaving a Portion of Webster Avenue, Borough of the Bronx, New York, With Old Blocks, Recut and Relaid

By S. C. THOMPSON,
Engineer of Highways, Borough of the Bronx, New York

WHEN Webster Avenue, New York City, was originally paved, in 1896, from East 165th Street to East 184th Street, it was done with granite blocks on a sand foundation, in accordance with the specifications then in use under the Bureau of Highways, viz.:

The blocks shall be of a durable, sound and uniform quality of granite, each measuring on the face or upper surface not less than eight (8) inches or more than twelve (12) inches in length, and not less than four (4) or more than five (5) inches in width and not less than seven (7) or more than eight (8) inches in depth. All stones shall be of the same quality as to hardness, color and grain. No outcrop, soft, brittle or laminated stone will be accepted.

The blocks as delivered and laid agreed fully with the requirements, and after a double railway track had been laid in the avenue and the blocks had been under constant heavy traffic for about 13 years it was found that, while the surface of the roadway was irregular and worn, the blocks had sufficient proper material left in them to suggest that they could be redressed and relaid, and thus save to the city a material sum, instead of repaving with new blocks and requiring the bidder to put in a price for removing the old blocks taken out, as has been the general custom. When the subject was considered carefully it was determined to repave a portion of the avenue from 165th Street to 171st Street and to have the contractor present alternative bids so that an excessive price for redressing and using the old blocks would not be offered. The bid called for 20,200 square yards of pavement, and proposed

A.—New granite block pavement on a concrete foundation laid with paving cement joints and keeping the pavement in repair for one (1) year from date of acceptance.

B.—Old granite blocks taken up, redressed with new heads and relaid with paving cement joints on a concrete foundation, and keeping the pavement in repair for one (1) year from date of acceptance.

The bid for Class "B" pavement included the cost of supplying any deficiency in the number of old blocks required to pave the designated area.

The bids received showed a material reduction in favor of redressing the old blocks instead of furnishing and laying new

ones, and the contract for Class B work was executed in March, 1909, with 125 working days allowed in which to do the work. There was a double-track trolley in the avenue, and the railway company owning the same elected to repave the portion between the rails instead of having it done under the contractor who paved the rest of the street, and this portion (between the rails) was done by the railway company without redressing the blocks and with sand joints. The contract price for redressing the granite blocks and relaying was $1.27 per square yard. Concrete for foundation was $4 per cubic yard.

The contract required the taking up of all existing curb, crosswalk and pavement, excavating the roadway for subgrade, laying the required foundation, curb, bridgestone, etc., and furnishing the material required for laying or relaying a granite block pavement on a concrete foundation, etc. The contractor was required to keep the avenue open to continuous traffic, either by completing one side first or by keeping one side far enough ahead so that the other side could be constructed and not interfere with traffic.

A concrete foundation 5 inches in thickness was laid for the pavement, the curb set in concrete and this connected with the pavement foundation, as shown on the diagram, Fig. 1. The railway company was required to adjust the tracks and tamp the same until no movement could be discovered. The sides of the rail between top and bottom flanges were filled with mortar mixed 1:4, thoroughly tamped in place so as to give a side-bearing for the pavement as laid. The contract called for the laying of the pavement from the curb to the rail instead of to the "railway area" (2 feet outside of rails) as usually required, excepting at intersecting streets, where the entire area within the crosswalks, including the railway area, was repaved by the contractor, as shown on the diagram by the shaded portion.

The concrete for the foundation and curb was a 1:3:6 mixture of Portland cement. Most of the mixing was done with a machine and the concrete cast or wheeled to place. The concrete was allowed to set about five days or more without having any traffic on it, and a bed of sand 1½ inches in thickness was laid, and on this the paving blocks were bedded.

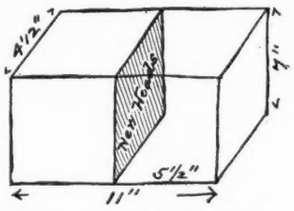


FIG. 3. MANNER OF SPLITTING 11X7X4½ BLOCK INTO TWO 7X5½X4½ BLOCKS.

The paving blocks which were taken up were an average of 7 inches in depth and of good size as to length, which allowed any block 11 inches or more in length to be cut in the middle (see sketch, Fig. 3), the new faces being dressed for tops, thus giving a top area of two blocks, each 7 inches in length, instead of one block 11 inches long as originally laid.

The blocks as originally furnished and laid were fairly well made, of Long Cove and Somes Sound stone, with a small proportion of Hurricane Island granite, the majority of them running well toward the maximum length allowed.

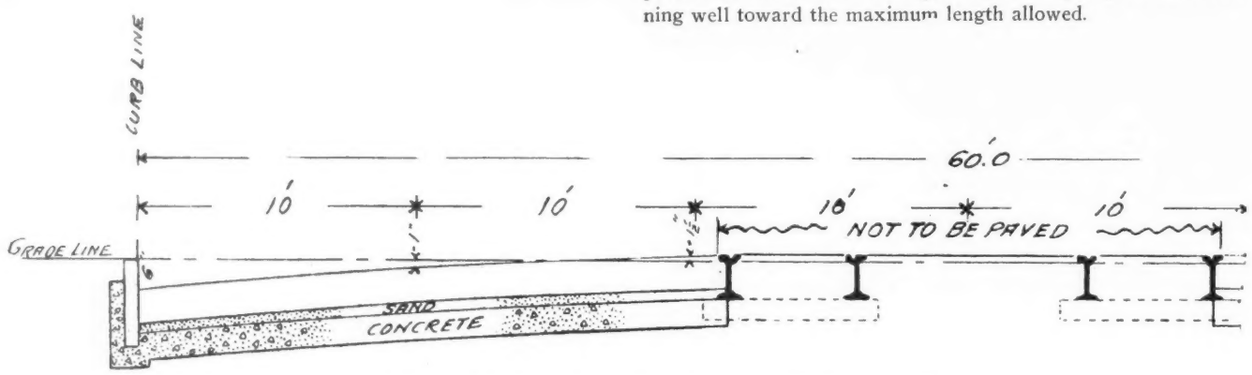


FIG. 1—PAVING SECTION BETWEEN STREET INTERSECTIONS

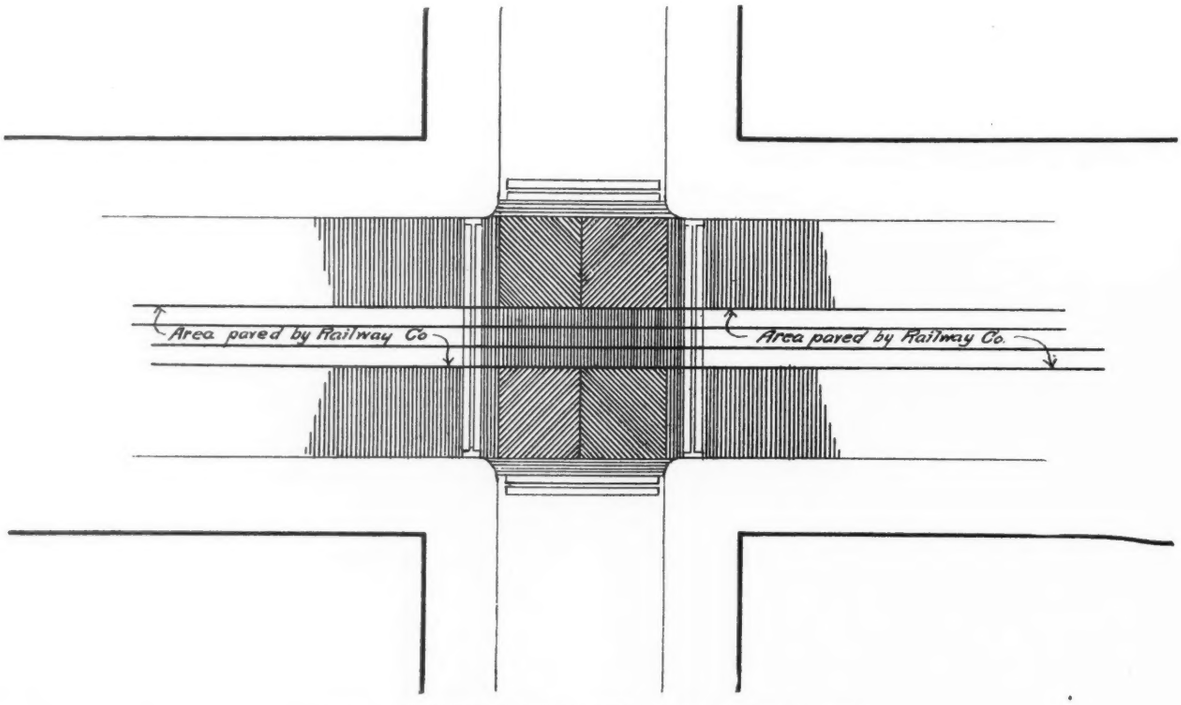


FIG. 2—SHADED AREAS ARE PAVED BY THE CITY

The specifications for the new work required the blocks to be *redressed with new heads,* so as to form, when laid, close end joints, and side joints not exceeding one inch. As a matter of fact, they were materially less than one inch, and with all surfaces fair and true. Blocks after recutting measured not less than 6 inches nor more than 12 inches in length, not less than 3½ or more than 4½ inches in width, and not less than 5½ or more than 6½ inches in depth. Longitudinal joints were broken by a lap of at least 3 inches.

Before the laying of the blocks had begun it was decided to use a cement grout joint instead of the usual bituminous or asphalt filler. Fine gravel was used in the joints, only as much as was necessary to hold the blocks in place during ramming and back-ramming, and the joints were then completely filled with Portland cement grout composed of one part cement and three parts sand. After the grouting of the joints, traffic was prohibited until the cement filler had thoroughly set.

This work as carried out has proved very satisfactory, producing a very even pavement surface, a full grout joint and a very material diminution in the noise from vehicular traffic.

The cost of the completed pavement at the contractor's price, including foundation and sand bed, was $1.84 per square yard. The cost of redressing the blocks was not far from $15 per thousand, or from 50 cents to 55 cents per square yard. A series of measured and counted areas showed that the average number of blocks laid was about 35 per square yard. In the entire area repaved the contractor had surplus blocks amounting to perhaps 5 per cent.

The work has not been laid a sufficient time to give a long-time test, but so far as indications go the wear is quite satisfactory.

A contract has been let to repave a considerable area in a similar manner during the coming season, but at an increased price per yard.

WEBSTER AVENUE, LOOKING NORTH FROM 165th STREET. REDRESSED GRANITE BLOCKS

ECONOMICS OF STREET PAVEMENTS

Comparison of Different Kinds of Pavements on Basis of Ultimate Total Cost—Paving as a Business Proposition—Adapting Pavement to Traffic—Factors of Durability—Comparison of Three Classes of Pavement

From report to Boston Finance Commission by Samuel Whinery, Consulting Engineer.

WHEN a street roadway is to be paved the first question that arises and must be decided is, what kind of pavement shall be used? To correctly answer this question involves the consideration of the relative value in use of the different kinds of pavement available and their adaptability to the varying conditions to which city streets are subjected. This may be called the economics of street pavements.

The economic questions involved in street paving are, to the public mind, the more immediately important ones and more appropriate for discussion in this report. Some of them only can be considered.

If we regard a pavement merely as a business enterprise the question becomes what kind of pavement, if laid on a given street, subject to known conditions, will yield the best return upon the money invested in it. Like other industrial questions this must be considered on business principles and in the light of the facts so far as these are known. It cannot be intelligently decided offhand or by mere casual opinion.

It is hardly necessary to say that there is a wide range of opinion in the public mind as to the comparative value and economy of the several pavements, and even among municipal engineers opinion is more or less divided. It is therefore proper to say that what follows represents my own personal judgment and conclusions, but it may not be out of place to add that these conclusions are the result of special studies and observations in many American cities, extending over more than a score of years, and of a large experience in the actual construction and maintenance of pavements. It is also proper to say that the opinions herein expressed generally agree closely with those of other engineers and specialists who have made street paving a subject of careful study.

The cost of a street pavement should be treated as an investment to accomplish a certain purpose with the smallest expenditure of money. The purpose is to keep a street properly paved, and considered from the business standpoint the question may be stated thus: How may a suitable pavement be maintained upon the street at the lowest cost per square yard per year?

It is quite common to base opinions of the economy of a pavement upon its cost price and its durability. These two elements are important only as they may affect the general account. Considered independently they may not only be of little real value, but may lead to erroneous conclusions. The first cost of one pavement may be double that of another, but if it gives three times as much return in service it is obviously the cheaper of the two.

Durability as applied to a pavement is only a comparative term. The relative durability of pavements has been a subject of wide discussion, often based on wrong assumptions, misinformation, or erroneous standards of comparisons. The life

of a pavement is determined by two wholly different factors or by their combined effect—the natural durability of the materials of which it is constructed and the wear and tear of travel.

All pavements are subject to more or less deterioration by age and the action of the elements, even if subjected to no travel. But some are thus more affected than others. Thus a well-constructed granite block pavement on a concrete foundation should last, if undisturbed, for a long period, while an untreated wood block pavement on a gravel foundation will be destroyed by natural decay in a few years. So far as destruction by natural decay is concerned, the life of a pavement is independent of the quantity of travel over it.

On the other hand, it is now well recognized that, disregarding the element of natural decay, the life of a pavement is measured by the quantity of travel to which it is subjected. In other words, if of two pavements, equal in other respects, one is subjected to double as much travel as the other its life in years will be but one-half that of the other. Consequently in pavements that are worn out before they are affected by natural decay the only true measure of their life is not the number of years they will last, but the total quantity of travel they will carry before they are worn out. The statement that a certain pavement on a certain street has lasted a dozen or any number of years gives no idea of its durability unless the quantity of travel, say in tons per square yard per year, is also given. In other words, the endurance of a pavement is not measured by years, but by the total service it is capable of giving.

To the neglect of this principle is largely due the very conflicting statements that are common about the relative durability of the several kinds of pavement. Until cities shall appreciate the importance of keeping a record, as by censuses of travel at regular intervals, of the quantity of travel carried by at least a few representative streets we shall have no exact knowledge of the relative durability of the several kinds of pavement, and in the meantime we must rely on such results of general observations as may be available.

The factors that must be taken into account in determining the comparative economy of the different pavements are the following:

1. The original cost of the pavement.
2. Interest on the original cost.
3. Payments to a sinking fund to redeem at some future time the debt incurred for construction.
4. Cost of maintenance, including cleaning and watering.
5. The useful life of the pavement, usually called its durability.
6. Value of the worn-out pavement for purposes of renewal.

Unfortunately the data for determining the value of some of these factors are far from complete or satisfactory. The first cost can usually be determined, and the prevailing rate of interest on money is known. For some kinds of pavements we have fairly satisfactory data as to cost of maintenance, for others we have not. The relative but not the actual durability or life of most of the pavements in common use is fairly well known to engineers, though the public generally has a wrong conception of it.

We shall be compelled, therefore, to make use of the best information available in the discussion that follows, and it is obvious that the conclusions arrived at may be only approximately correct, but the errors due to lack of complete data are likely to be so small and unimportant that they will hardly change the general conclusions.

Using the best information available, we may compute the cost per square yard per year of keeping a street properly paved with a given kind of pavement for any period of years.

Take, for example, a first-class granite block pavement on the heaviest-traveled business streets of the city of Boston. The original first cost, including the necessary excavation, should be about $3.86 per square yard. If the pavement be paid for by an issue of bonds, the interest paid on the bonds is justly chargeable to the pavement. Assume that the pavement will last, with ordinary repairs, 13 years before it needs to be reconstructed. During this period the pavement will require more or less ordinary repairs, which we will not be very wrong in estimating will cost an average of 1½ cents per square yard per year, which obviously is also a legitimate charge against it that must be taken into consideration.

The reconstruction will not cost as much as the original construction, because the excavation will have been done, and the concrete foundation should be still good and available for the reconstructed pavement. The old blocks taken up should still have a value equal to the cost of taking them up and of making such incidental repairs to the concrete as may be found necessary.

The cost of reconstruction with new blocks would be about $3 per square yard, and when completed the pavement should be practically as good as the original pavement when new.

The cost of reconstruction should be met without increasing the original debt, since it is really a part of the permanent maintenance of the pavement, and to do this we may provide a sinking fund by setting aside each year during the life of the original pavement a sum which, at the time the reconstruction must be undertaken, will amount to its estimated cost.

The operation of renewing the pavement may be repeated any number of times in this way without increasing the debt incurred for the original construction. But this debt will remain, and if the bonds were issued for a period of 30 years a sinking fund must be established to take them up when they fall due.

We have now provided for the structural expenses of the pavement, but other expenses must be incurred to care for it properly. It must be kept clean, and, inasmuch as the cost of cleaning the different kinds of pavement varies, we must, if we wish to compare the cost one with another, take this expense into consideration. The same is true of watering, but if a granite pavement be kept properly cleaned watering will not be necessary, and we may disregard its cost.

Considering all these items, we may make up the cost of maintaining 1 sq. yd. of the pavement per year as follows:

Interest on first cost ($3.86 at 4 per cent)	$0.154
Annual payment to fund to redeem bonds in thirty years, interest 3½ per cent	.075
Annual payment to sinking fund to provide sum necessary for reconstruction at end of thirteen years	.152
Cost of ordinary repairs during the life of the pavement per square yard per year	.015
Cost of cleaning per square yard per year, say	.190
Total cost per square yard per year	$0.586

We thus find that the actual cost of this pavement to the city is about 59 cents per square yard per year.

Every item here entered is a legitimate charge against the pavement, though it is not asserted that the amount charged is strictly accurate. The method followed is in principle the same as any careful business man would apply in getting at the true cost of the products of his factory. Assuming the same general conditions, we may make similar computations to determine the annual cost of other kinds of pavement.

It is only by the application of such methods that the annual cost, and therefore the comparative value, of the different kinds of pavement can be intelligently ascertained.

Applying this method to the three kinds of roadway pavement most largely in use in Boston—granite block, sheet asphalt, and macadam—we may compute the annual cost of each under average conditions. These conditions obviously vary with the character of the streets, which for our present purpose may be divided into four general classes:

A. Streets with a very large volume of travel of the heaviest character, as central business streets.

B. Secondary business streets with travel of moderate volume and weight.

C. Main city or suburban thoroughfares having a large volume of comparatively light travel.

D. Suburban or residence streets where travel is mainly of a local character and light.

A different character of construction for the same kind of pavement is appropriate for these different classes of streets, and its first cost will therefore vary with the class. For instance, granite block pavements for Class A and Class B streets should be laid upon a concrete foundation, while for

Classes C and D a broken stone foundation may be sufficient, and where a concrete foundation is used its thickness may vary with the different classes of streets.

Considering, first, granite block pavement, we may figure its annual cost per square yard for the four classes of streets as shown in Table I:

TABLE I—COST OF GRANITE BLOCK PAVEMENTS

Specifications:	Classes of Streets. A.	B.	C.	D.
Foundation	6-in. con.	5-in. con.	6-in. br. st.	6-in. br. st.
Depth of blocks	7-in to 8-in.	6-in. to 7-in.	7-in to 8-in.	6-in. to 7-in.
Joints filled with	Grout.	Grout.	Grout.	Grout.
First cost, original pavement	$3.86	$3.45	$3.30	$3.30
Cost of renewal	2.45	2.40	2.20	2.20
Estimated life in years	13	17	16	20
Annual cost of pavement per square yard:				
Interest on original cost, 4 per cent	$0.154	$0.138	$0.132	$0.132
Payment into sinking fund to redeem bonds, 30 years at 3½ per cent.	.075	.067	.064	.064
Payment into sinking fund to meet cost of renewal, at 3½ per cent.	.152	.106	.110	.078
Average cost of ordinary repairs	.015	.010	.005	.005
Cost of cleaning per year	.190	.118	.118	.079
Total annual cost per square yard of maintaining the pavements.	$0.586	$0.439	$0.429	$0.358

In the same manner the cost of sheet asphalt pavement per square yard per year may be computed as in Table II:

TABLE II.—COST OF SHEET ASPHALT PAVEMENTS

Specifications:	Classes of Streets. A.	B.	C.	D
Foundations:	7-in. con.	6-in. con.	5-in. con.	4-in. con.
Thickness of Binder course	1½ in.	1½ in.	1 in.	1 in.
Thickness of surface course	2 in.	1½ in.	1½ in.	1½ in.
First cost of original pavement	$2.98	$2.64	$2.15	$2.15
Cost of renewal	1.55	1.45	1.35	1.35
Estimated life in years	9	12	14	16
Annual cost of pavement per square yard:				
Interest on original cost, 4 per cent	$0.119	$0.106	$0.093	$0.086
Payment into sinking fund to redeem bonds, 30 years at 3½ per cent.	.058	.051	.045	.042
Payment into sinking fund to meet cost of renewal, at 3½ per cent.	.149	.100	.076	.064
Average cost of ordinary repairs	.100	.040	.030	.016
Cost of cleaning	.150	.084	.084	.056
Total annual cost per square yard of maintaining the pavements.	$0.576	$0.381	$0.328	$0.264

The annual cost of macadam pavement may be arrived at as shown in Table III:

TABLE III.—COST OF MACADAM PAVEMENTS

Specifications:	Classes of Streets. A.	B.	C.	D.
Thickness of metal	9-in.	8-in.	7-in.	6-in.
Estimated life in years	5	6	7	10
First cost per square yard	$0.64	$0.60	$0.51	$0.51
Cost of renewal	1.26	1.16	1.05	0.94
Annual cost of pavement per square yard:				
Interest on original cost at 4 per cent	$0.050	$0.046	$0.042	$0.038
Payment into sinking fund to meet renewal, 3½ per cent	.119	.092	.066	.043
Payment into sinking fund to redeem bonds, 30 years at 3½ per cent.	.024	.022	.020	.018
Average cost of ordinary repairs	.400	.250	.150	.040
Cost of cleaning	.150	.080	.070	.030
Cost of watering	.045	.035	.030	.025
Total annual cost per square yard of maintaining the pavements.	$0.788	$0.525	$0.378	$0.194

For a ready general comparison of results Table IV may be constructed:

TABLE IV.—COMPARISON OF COST OF VARIOUS PAVEMENTS

	Classes of Streets. A.	B.	C.	D.
Granite block	$0.586	$0.439	$0.429	$0.358
Sheet asphalt	.576	.381	.328	.264
Macadam	.788	.525	.378	.194

These results are not presented as strictly accurate or conclusive. In the present state of our information they must be regarded as approximate only. All the conditions assumed and used may differ in any one city, and are likely to differ in different cities. Emphasis is laid upon the method of estimating the economic value of pavements rather than upon the correctness of the data here used. It may, I think, be claimed that the data and results are approximately correct for Boston, and that they represent the best general information available at this time.

The figures given for first cost and cost of renewal represent what, in my opinion, should be the maximum costs in Boston at this time. The actual cost is and has been for many years much higher.

The assumed life of the pavements in years represents what should be their useful life. There comes a time in the life of every pavement when it will be cheaper to renew it than to continue repairing the old. Pavements are often continued in use long after it would be more economical to renew than to continue to repair them. The above computations assume that the useful life ends when they should be renewed rather than further repaired. The life given in the tables also assumes that the pavements are properly constructed originally and properly renewed when renewal becomes necessary and that they are kept in a good state of repair.

Referring to Table IV, it appears that for Class A streets macadam is the most expensive pavement to use, and that there is a slight difference in favor of sheet asphalt over granite. But other considerations, the principal one being the difficulty and inconvenience of making the frequent and quite expensive repairs that would be necessary to an asphalt pavement on a crowded street, clearly indicate that the granite pavement is preferable.

For Class B streets macadam is also decidedly the most expensive, while sheet asphalt is decidedly the most economical.

On Class C streets granite is the most expensive, and there is a material difference in favor of sheet asphalt over macadam, but the relative cost of the two does not differ very widely.

For Class D streets granite is comparatively very expensive, and macadam is so decidedly the cheapest that if economy alone is considered it merits almost exclusive use.

WOOD PAVING BLOCK SPECIFICATIONS

Adopted by Highway Engineers of New York—Result of Conference of Engineers and Manufacturers—Admitting General Competition

The matter of specifications for wood paving blocks, the kinds of wood which could be used to advantage, and especially the amount and nature of creosoting which should be required, has been one concerning which little definite information has been had by any city engineers or others outside of the wood block paving manufacturers and their chemists. For years wood block paving was purchased merely as the product of this or that manufacturer and contractor. As was the case in the early days of sheet asphalt, however, increased use of this kind of paving made it very important that specifications should be adopted which could be used as a standard for pavement, rather than relying upon merely the name of the manufacturer; and several cities have been purchasing wood block pavement by specification during the past year or two. The general lack of information concerning the subject, however, has led to the adoption by a number of cities of requirements in the specifications which the manufacturers of wood blocks declare to be either impossible of attainment or as requiring unnecessary expense without any compensating benefits.

With the idea of improving upon this condition, the President of the Borough of Manhattan, New York, on May 14, 1909, requested the Board of Estimate and Apportionment to appoint a commmittee to prepare standard specifications for wood block pavement which might be employed in the several boroughs of Greater New York, in which city a great deal of wood block pavement had in the past been laid. The board referred the matter to a committee consisting of the Chief Engineer of the Board of Estimate and Apportionment, Mr. Nelson P. Lewis; Mr. George W. Tillson, Chief Engineer of Highways of Manhattan; Mr. S. C. Thompson, Chief Engineer of Highways of the Bronx; Mr. Theodore S. Oxholm, principal Assistant Engineer of Highways, Borough of Richmond; Mr. John C. Sheridan, Chief Engineer of Highways, Borough of Brooklyn; Mr. Robert R. Crowell, Chief Engineer of Highways, Borough of Queens, and Mr. Chandler Withington, Chief Engineer Department of Finance. This committee considered the matter during the summer, holding a number of meetings and giving hearings to the principal manufacturers and contractors who were engaged in the treatment of wood paving blocks and the furnishing and laying of them in New York and vicinity. The views of these and those of the several engineers were carefully compared, and the committee a few months later recommended the adoption, in the specifications for wood block paving, of standard paragraphs relating to the kind of wood to be used, the grade of lumber, the sizes of blocks, the kind of oil and the amount to be used per cubic foot, and an absorption test of the blocks and a test of the oil used.

There was considerable difference of opinion on the part of manufacturers as to the grade of lumber desirable for paving blocks, some recommending the highest grade obtainable, with little sap, and others expressing the opinion that the presence of sap is immaterial. All agreed, however, that the difference in price between "prime" and "merchantable" or between "merchantable" and "standard" will not exceed 5 or 6 cents per square yard for each grade at the present time; and the committee therefore concluded to recommend the use of prime lumber as defined in the Interstate Rules of 1905 for the classification and inspection of yellow pine lumber. The committee also recommend the use of long leaf yellow pine or Southern black gum, the grade of black gum being that corresponding with the prime lumber in the classification of long leaf yellow pine.

As to the kind of oil to be used in treating the blocks, the committee found even a greater difference of opinion among the manufacturers, and, after considering their several arguments, endeavored to frame a specification broad enough to include any antiseptic and waterproof oil which will accomplish the results desired.

The committee did not go into the subject of foundations or methods of laying the block, but merely that of the blocks themselves. This leaves open the matter of joint fillers and whether the blocks should be set upon a sand cushion or directly upon concrete foundation after the latter has been smoothed up to exact grade with cement mortar.

The specification clauses adopted by the Board of Estimate and Apportionment and recommended for use by all the Borough Presidents are as follows:

Kind and Grade of Wood

The material to be treated shall be wood blocks, which may be either of Southern long leaf yellow pine or Southern black gum, and is to be subject to inspection at the works in the stick before being sawed into blocks.

Yellow pine blocks shall be cut from what is known as prime timber as defined by the Inter-State Rules of 1905, namely, all lumber must be sound, commercial, long leaf, yellow pine, well manufactured, full size and saw butted, and shall be free from the following defects: Unsound, loose and hollow knots, worm holes and knot holes; through shakes or round shakes that show on the surface; shall be square edge, and shall show two-thirds heart on both sides.

Black gum blocks shall be cut from timber that is first-class in every respect and shall be of the same grade as that defined for yellow pine.

Size of Blocks

The paving blocks cut from the lumber above specified shall be well manufactured, truly rectangular and of uniform dimensions and their depth parallel to the fibre shall be four inches; their length shall be eight inches, and their width shall be three inches, provided that on light traffic streets the blocks may be three and one-half inches deep. No variations of the above dimensions to exceed one-sixteenth of an inch in width or depth or one inch in length.

Treatment of Blocks and Absorption Test

The blocks shall be so treated with an oil elsewhere described that the pine blocks shall contain not less than twenty and the gum blocks not less than twenty-two pounds per cubic foot.

After treatment the blocks are to show such waterproof qualities that after being dried in an oven at a temperature of 100 degrees for a period of twenty-four hours, weighed and then immersed in clear water for a period of twenty-four hours and again weighed, the gain in weight is not to be more than 3½ per cent for pine blocks and 4½ for gum blocks.

Character of Oil

The oil with which the blocks are to be treated shall be a stable, antiseptic and waterproofing oil from which the water has been removed by distillation, and which shall have a specific gravity of not less than 1.12 at 38 degrees centigrade.

When distilled in the manner hereinafter described, the oil shall lose not more than 35 per cent up to a temperature of 315 degrees centigrade. The distillate between 255 degrees centigrade and 315 degrees centigrade shall have a specific gravity not less than 1.02, the said specific gravity being taken at a temperature of 60 degrees centigrade.

Method of Testing Oil

One hundred grams of oil are weighed out into a glass retort preferably made of Jena glass, having a capacity to bend of neck of 250 cc. A condensing tube, air-cooled, is attached to the retort of such length that the total distance from the tubulure to the end of the condensing tube shall be approximately 60 cm. The tubulure is fitted with a cork through which a nitrogen filled thermometer registering to 400 degrees C. and about 40 cm. in length is inserted in such a manner that the bottom of the bulb shall be not less than one-half inch above the liquid at the time distillation commences. The first reading on the emergent stem of the thermometer shall be not less than 80 degrees and no correction is made for the emergent stem. The distillation is made in a place free from draughts and the retort is heated by the direct flame of an adjustable burner. The oil is warmed cautiously until any water that may be present is expelled. If water is present, the amount is reported separately, all results being calculated on a dry oil basis. The flame is then regulated in such a manner that the rate of distillation shall continuously be not slower than one drop per second, and not faster than two drops per second. The distillates are collected in weighed Erlenmeyer flasks. The specific gravity of the fraction boiling from 255 degrees—315 degrees C. is determined by means of a specific gravity bottle having a capacity of about 10 cc. The oil previously warmed is poured into the bottle, which is then placed in a thermostat kept at 60 degrees C. for one-half hour. The stopper is then inserted, the excess of oil is wiped off and after cooling the weight is obtained. This weight is compared wth the weght of water at 60 degrees C. whch the same bottle contains.

One result of the adoption of these specifications was that, in bids received for wood block paving last fall, somewhat lower bids were received for blocks 4 in. deep than had previously been obtained for blocks 3½ in. deep.

This subject was also considered by a convention of municipal officials of a large number of cities which met in Chicago, Feb. 21 to 26, at the invitation of Mayor Busse, the results of which convention are given elsewhere in this issue. The same subject is also being considered by a committee of the American Society of Municipal Improvements, which is to report upon the same at the October meeting of the society.

ASPHALT BLOCK PAVING IN TOLEDO

Composition of Blocks—Specifications for Blocks and for Laying—Old Pavements Unsatisfactory Because of Slack Inspection—Improved Methods

By F. I. CONSAUL

THE experience of Toledo with asphalt block as a paving material dates back to the year 1900, when the first street was paved with this material. It being the first of this type of pavement laid in this vicinity it naturally attracted unusual attention. Toledo's experience with this material covers two distinct periods, as will be seen below.

During the first period the blocks were manufactured by the Lake Erie Asphalt Block Company, whose plant was located in Toledo. This company also contracted for the work of laying most of the pavements of this type. The period during which this company manufactured and laid the material in Toledo extended from 1900 to 1904, inclusive. The specifications under which the blocks were made and laid for new work were as follows:

SPECIFICATIONS FOR ASPHALT BLOCK PAVING, 1900-1904.

1. Asphalt Block Pavement.—(a) The size of the blocks will be 4 x 4 x 12 inches, and a variation of one-fourth (¼) of an inch from these dimensions will be sufficient grounds for rejecting any block.

(b) The blocks will be composed of—

	Per cent.
Asphalt cement	8 to 12
Crushed quartz, granite, or other sound and hard stone	92 to 88

2. Asphalt.—The crude asphalt shall be refined until homogeneous and free from water. It shall not at any time reach a temperature high enough to injure it.

3. Heavy Petroleum Oil.—The oil in use in the manufacture of asphalt cement shall be a petroleum from which the lighter oils have been removed by distillation without cracking, until the oil has the following characteristics:

Flash point, not less than 300 degrees Fahrenheit.

Distillate at 400 degrees for 30 hours, less than 10 per cent.

The flash point shall be taken in a New York State Closed Oil Tester.

The distillate shall be made with about 50 grammes of oil in a small glass retort, provided with a thermometer and packed entirely in asbestos. The residue in the retort, after distilling, must be fluid at 75 degrees Fahrenheit, and not coarsely crystalline on cooling.

Any other softening agents fulfilling the above tests, and approved by the City Civil Engineer, may be used in place of Petroleum oil.

4. Asphaltic Cement.—When the refined asphalt is not already of the proper consistency, the cement shall be prepared by tempering refined asphalt with heavy petroleum oil or other approved softening agent complying with the above specifications (at a temperature between 250 degrees and 350 degrees Fahrenheit). The asphalt cement must not be inferior in quality to a cement made of the best quality Trinidad asphalt and petroleum residuum. Its penetration must be within the range of 60 and 120, D. C. standard of hardness, and will be fixed by the Engineer.

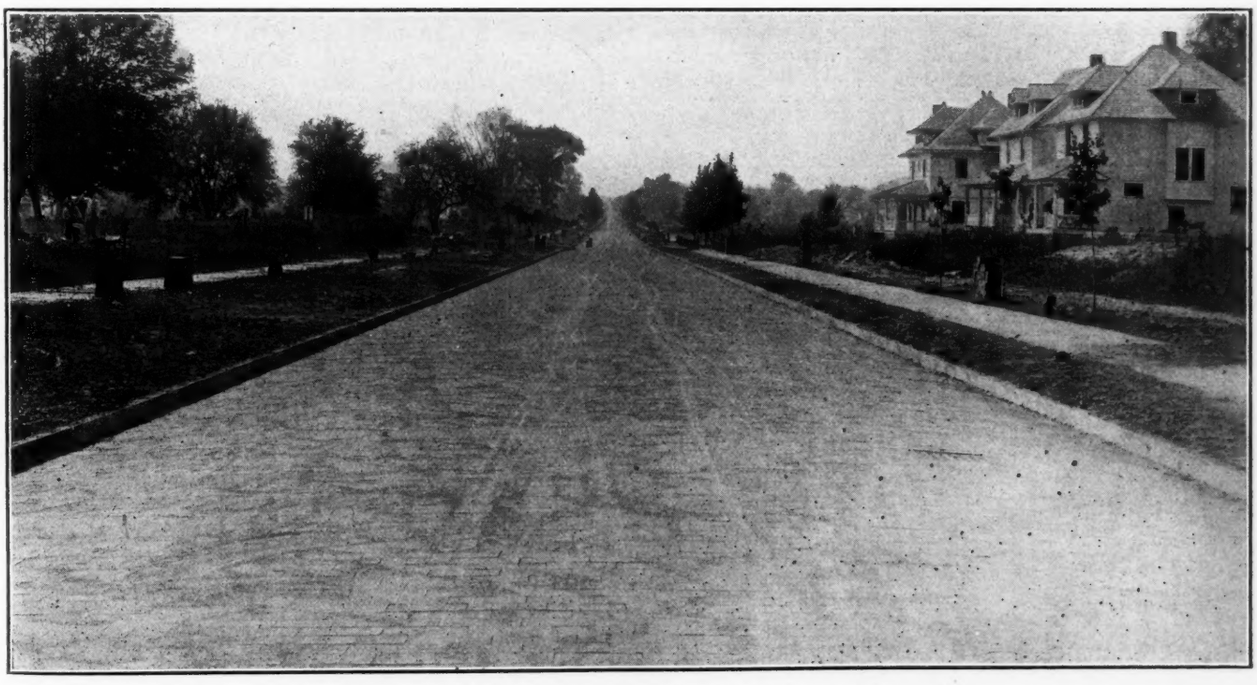
The asphalt cement must never be heated to a temperature exceeding 350 degrees Fahrenheit.

Where asphaltic cement containing over 10 per cent. of foreign material is kept in storage, it must be thoroughly agitated when used, as must also all dipping kettles while in use.

Samples of the asphaltic cement and of the petroleum oil shall be supplied to the City Civil Engineer when required, in suitable tin boxes and cans, and he shall have access to all branches of the works at any time.

5. Sample.—All bids must be accompanied by a specimen block of the size and quality described in these specifications, labeled with the name of the bidder and the locality of the factory. Bids not accompanied by specimen blocks will not be accepted. The blocks will be tested for specific gravity and tensile and crushing strength; all blocks furnished must be equal in quality to the sample as determined by the City Civil Engineer.

6. Roadbed.—The space over which the pavement is to be laid having been excavated to the proper depth below the surface of the pavement when completed, any objectionable or unsuitable matter below the earth will be wholly removed, and the space filled with dry earth compactly rolled or rammed. The bed will then be trimmed so as to be parallel to the surface of the pavement when completed, and the entire roadbed will then be thoroughly compacted by rolling with a roller weighing not less than ten tons, or by thorough ramming at places which can not be reached by the roller. No extra allowance will be made for trimming and rolling.



ASPHALT BLOCK PAVEMENT LAID IN TOLEDO IN 1908

7. Bed.—Upon this foundation as above is to be laid a 6-inch bed of good gravel, or broken stone, to the acceptance of the City Civil Engineer, the bed to be six (6) inches thick when thoroughly compacted. It will be thoroughly compacted by rolling with a roller weighing not less than ten tons or by heavy ramming at places which cannot be reached by the roller. The rolling will be continued until the bed cracks under the roller without compressing further. Upon this will be laid a bed of fine sharp sand, one (1) inch in thickness, to serve as a bed for the blocks, which will be laid directly upon it with close joints. Special care will be observed to make the surface of this bed of sand exactly parallel to the surface of the pavement when completed. The blocks must be laid by the pavers standing or kneeling upon the blocks already laid, and not upon the bed of sand. The gravel to be used is to be equal in quality to a sample exhibited in the office of the City Civil Engineer. If broken stone is used, the specifications therefor as to size, quality, etc., will be the same as for concrete foundation, in the specifications for paving, except that the lower course will be 4½ inches thick; upon this will be laid a bed of screenings 1½ inches thick, both layers to be rolled as above specified. The sand cushion will be as specified above.

8. Method of Laying.—The blocks are to be laid at right angles to the line of the street, and with such crown as the plans may show; each course to be of blocks of a uniform width and depth, and so laid that all longitudinal joints shall be broken by a lap of at least four (4) inches. Each course of blocks will be driven against the course preceding it by a heavy maul, in order to make the lateral joints as tight as possible, and the longitudinal joints will be closed by pressing each course in the direction of its length by a lever. When thus laid the blocks will be immediately covered with clean, fine sand, entirely free from any loam or earthy matter, perfectly dry and screened through a sieve having not less than twenty (20) meshes to the inch. The blocks will then be carefully rammed by placing a plank over several courses and ramming the plank with a heavy rammer. The ramming will be continued until the blocks reach a firm, unyielding bed and present an uniform surface, with proper grade and crown. Any lack of uniformity on the surface must be corrected by taking up and relaying the blocks. When the ramming is complete a sufficient amount of fine, dry sand, as above described, will be spread over the surface and swept or raked into the joints.

In the case of repaving, where the old concrete foundation was used, the blocks were made 3 inches thick only. In one case the blocks were laid in a wet cement mortar bed ½ inch thick. The mortar was spread in small areas at a time and brought to a true contour by the use of a steel template. The blocks were laid and quickly tamped out to a smooth surface while the mortar was yet plastic. The joints were then filled with a thin cement grout and the pavement was kept closed to traffic for a period of seven days. As the above method materially retarded the progress of the work, all subsequent repaving on a concrete foundation was laid on a bed of dry-mixed mortar one inch thick, brought to a true surface with a template as before. The surface was then sprinkled with water just preceding the laying of the blocks. In this case the joints were filled with fine dry sand.

The rock used was the copper sands, a waste product from the copper stamp mills of the Lake Superior copper-ore regions. This was brought down by boat in large cargoes and unloaded directly upon the docks of the company's plant located upon the Maumee River, just below the city.

The following tabulation gives the year, the number of streets, the quantities and the average prevailing prices for each year.

Year.	Number of Streets.	Square Yards.	Miles.	Average price per sq. yd.
1900	4	15,400	.93	$1.98
1901	9	35,150	1.86	2.11
1902	6	66,138	2.96	1.98
1903	3	36,145	1.69	1.97
1904	2	37,462	1.66	1.91
Total	24	190,295	9.10	

Of the streets included above, 14 were restricted to the residence district; two to the down-town business district, and the remaining eight were improved with both business and residence properties.

Soon after the last street was laid, in 1904, it was noticed that there was a tendency on some of the streets for the blocks to disintegrate and crumble off at the joints, while on other streets the blocks remained intact.

This led to an investigation and it was found that, through lack of rigid inspection and analysis at the plant, the workmen had become careless and negligent in not obtaining a uniform temperature and proportion of materials during the process of mixing and pressing. As a result of this the company was compelled to take up and relay a considerable portion of two or three of the streets within a few months after the pavement was down. This defect in supervision and manufacture relative to some of the work naturally gave this material a decided setback in Toledo and vicinity for the time being.

The condition of affairs that soon followed led to a receivership for the company and all work was suspended at the plant until 1907. After the company became insolvent the responsibility for the repair of the streets devolved upon the city. These repairs were made by the Board of Public Service through the Street Department. As there was no supply of asphalt blocks on hand, different materials were experimented with in making repairs. The blocks would deteriorate and crumble away in patches, leaving deep depressions. In these places the blocks were entirely removed and repaved with either vitrified brick, sheet asphalt, or with an asphaltic macadam. The last-named method proved to be an economical and effective way of repairing these streets. Repairs of this nature have been made as necessity required for the past three or four years. Other of the streets laid by the old company are still in almost perfect condition, including the first one, which

LAYING ASPHALT BLOCK ON SCOTTWOOD STREET, TOLEDO, IN 1908

was laid 10 years ago and which, judging from its appearance, is good for 10 years more.

When the receivership was concluded the plant was taken over by a subsidiary company of the Hastings Pavement Company, of New York, whose plant is located at Hastings-on-the-Hudson. The new local company was organized under the name of "The Asphalt Block Pavement Company," and thus the second period of the asphalt block industry in Toledo was begun.

The plant was thoroughly overhauled and new hydraulic presses installed of sufficient power to exert a pressure of 250 tons upon each block. The company installed a thoroughly equipped laboratory for both physical and chemical tests of the blocks and materials in order to guard against a repetition of the defects developed in the blocks of the former company.

In 1908 the new company, in the face of determined opposition and public sentiment, secured a contract to pave their first street in Toledo. During the season of 1909 four other streets were laid. A summary of the work done by the new company follows:

Year.	Number of Streets.	Square Yards.	Miles.	Average price per sq yd.
1908	1	5,770	.37	$1.91
1909	4	14,745	1.01	1.91
Total	5	20,515	1.38	

One of the streets laid in 1909 was in the business district and subjected to heavy traffic, while the other four were in the residential section. On the business street the traffic has had the effect of ironing out the joints, owing to the malleability of the block, until it has the appearance of sheet asphalt, the joints having disappeared. This condition is also developing upon the residence streets.

Following are the specifications used by the city in the above work:

SPECIFICATIONS FOR ASPHALT BLOCKS, 1908-1909.

The Blocks.—The blocks shall be five (5) inches in width by twelve (12) inches in length by three (3) inches in depth, and a variation one-quarter (¼) of an inch from these dimensions will be sufficient ground for rejecting any block.

The blocks must be composed of the following materials:

Asphaltic cement..... 9 to 13 per cent
Conglomerate copper sands.....76 to 62 per cent
Limestone dust.....15 to 25 per cent

The copper sands in the blocks must be crushed so that every particle will pass a screen of three-eighths (⅜) of an inch mesh. The blocks must receive a compression in the moulds of not less than one hundred and twenty gross tons; and must weigh not less than 14½ pounds per block. The blocks shall yield, when extracted wtih bisulphide of carbon and after the evaporation of the solvent, not less than 6½ per cent nor more than 8½ per cent of bituminous matter.

Asphaltic Cement.—The asphaltic cement shall be composed of steam-refined Trinidad "Lake" asphalt, and heavy petroleum oil, or other equally good flux. The refined asphalt and the flux shall be mixed in such proportion as will produce an asphaltic cement of a proper consistency and quality. The heavy petroleum oil shall be free from impurities and brought to a specific gravity of from 10 to 14 degrees Beaume, and shall have a fire test of not less than 350 degrees Fahrenheit; it shall contain no appreciable amount of light oils or matter volatile under 250 degrees Fahrenheit, and the distillate at 400 degrees Fahrenheit for thirty hours shall be less than 10 per cent. Any other flux, if used as a substitute for the heavy petroleum oil shall also fulfill the above tests, except that for specific gravity.

The soil and perishable matter shall be removed and the street brought to a surface which shall be exactly nine (9) inches below and parallel with the surface of the finished pavement, and thoroughly rolled or rammed. All filling required to obtain this surface shall consist of clean, gritty earth. Upon this subgrade so formed shall be spread a layer of cement concrete five and one-half (5½) inches in thickness and prepared as follows:

Concrete Foundation.—The cement for the concrete shall be American Portland Cement. If the mixing is done by hand one measure of cement shall be mixed dry with four measures of sand. This mixture shall be at once incorporated with seven (7) measures of stone, drenched with water, and thoroughly and rapidly mixed, adding the proper amount of water, until each piece of stone shall be completely coated with mortar, when it shall be spread upon the ground and tamped until thoroughly compacted. Care must be exercised to make this surface parallel to three and one-half (3½) inches below the top of the finished pavement. The finished concrete shall stand all reasonable tests of the engineer.

If required, samples of the cement it is proposed to use must be furnished the engineer not less than seven (7) days before it is to be used, and no brand of cement shall be used which has not been acceptd by the engineer. The concrete may be mixed by machinery, if desired, care being taken that the proportions are as specified above.

The sand shall be clean and sharp.

The stone shall be trap, granite, limestone, or other hard rock, and shall not be more than two (2) inches in its greatest dimension. Should the contractor so desire, however, fifty per cent of the stone may be replaced by gravel perfectly free from sand which shall have passed through a screen with one and three-quarter (1¾) inch meshes and shall have been retained by one with a mesh of one-half an inch.

No concrete can be used which shall have been mixed for more than thirty minutes. No carting or wheeling shall be allowed on the concrete until it is sufficiently set. When connection is to be made with any section which shall have set or partially set, the edge of such layer shall be broken down, shall be free from dust or dirt and shall be properly wet.

Mortar Bed.—Upon the surface of this concrete foundation shall be spread a bed of cement mortar one-half (½) inch in thickness, which shall bring the thickness of the complete foundation up to six (6) inches. This mortar bed shall be composed of a slow setting Portland cement and clean, sharp sand, free from pebbles over one-quarter (¼) inch in diameter, and mixed in the proportion of one part cement to four parts sand. This mortar bed shall be "struck" to a true surface exactly parallel to the top of the finished pavement and three (3) inches below it, in the following manner:

On the surface of the concrete shall be set strips of wood four (4) inches wide by one-quarter (¼) inch thick, and of a length equal to the width or half width of the street, if practicable, or strips of steel four (4) inches wide by one-eighth (⅛) or three-sixteenths (3-16) inch thick and of a convenient length may be used. These strips shall be carefully set from curb to curb to the exact crown of the street and imbedded throughout their length in mortar, so that the top surface of the strips shall be three (3) inches below the grade of the finished pavement. An iron shod straightedge or "striker" shall be used on two sets of strips, set as described above, eight (8) or ten (10) feet apart, to strike the mortar bed to a true and even surface. As soon as the bed has been struck up one set of strips shall be taken up and the trench carefully filled with mortar.

Upon this mortar bed the blocks shall be immediately laid with close joints and uniform top surface.

The blocks shall be laid by the pavers standing upon the blocks already laid, and not upon the bed of mortar.

Laying the Blocks.—The blocks shall be laid at right angles with the line of the street with such such crown as the engineer may direct; and in such manner that all longitudinal joints shall be broken by a lap of at least four (4) inches. The blocks shall be so laid as to make the lateral joints as tight as possible, consistent with keeping a good alignment of the courses across the street, and the longitudinal joints shall be immediately closed by pressing each course in the direction of its length by a lever. When thus laid the blocks shall be immediately covered with clean, fine sand, entirely free from any loam or earthy matter, perfectly dry, and screened through a sieve or screen having not less than twenty meshes to the inch. This sand shall be swept over the surface until the joints are all filled and shall be allowed to remain on the pavement not less than thirty days; or for such a time as the action of the traffic on the street shall have thoroughly ground the top sand into all the joints.

In case of car tracks in the street a template shall be used, to run on the rails, to strike the mortar bed to the required grade between the rails of the car track.

It is to be distinctly understood that these specifications are those of the Asphalt Block Pavement Co., of Toledo, O., and that said company is to assume all responsibility for their conditions and requirements.

The contractor will give a maintenance bond that shall be satisfactory to the Board of Public Service for an amount equal to fifty (50%) per cent of the cost of the work providing for the repair of the work done under this contract as otherwise specified for a period of five years from the date of the acceptance of the improvement.

While the blocks specified by the city are 3 inches thick, the new presses recently installed by the new company can be so adjusted that any desired thickness can be obtained.

It is thought that the asphalt block matter has been solved in Toledo and that, from the experience the city has had with the new product, confidence in this material will be restored.

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MARCH 2, 1910

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Modern Block Paving

A LARGE part of the present issue is devoted to articles concerning pavements composed of blocks, either brick, asphalt, stone or wood. This seems particularly appropriate because of the discussion and agitation now being carried on among engineers and street authorities generally towards improving the character of these several kinds of pavements or standardizing specifications covering them. It seems to be something of a coincidence that renewed interest should be taken and new ideas advanced in all kinds of block pavement at just this time. As described last week, engineers of a number of first-class cities are endeavoring to secure smoother stone block pavements. Pavement engineers generally are endeavoring to formulate satisfactory specifications for wood paving blocks, and the city of New York has adopted a recent form which is given in this issue and which has resulted in more general competition and lower prices. The National Brick Manufacturers' Association is endeavoring to evolve a more perfect method of testing brick, the rattler test especially having been proved by experience to fail in fully meeting the requirements. Each of these subjects is also the subject of investigation by a committee of the American Society of Municipal Improvements, and was considered last week at a convention in Chicago of nearly one hundred city officials engaged in practical pavement construction, together with manufacturers and others interested from a business point of view. There are indications also that the manufacture of asphalt paving blocks will soon be undertaken by a greater number of firms, with a possible lowering of prices and increase of use.

Brick pavements constitute just about one-fourth of the total permanent pavements in the country (excluding macadam, gravel and cobble stone); these being exceeded in amount by asphalt only. In describing brick pavements we have taken Cleveland as an illustration chiefly because in that city are found more square yards of brick pavement than in any other city of the country; and it is also said by experts that no other city contains such a large percentage of first-class smooth brick pavements. Columbus, O., is fourth or fifth in the yardage of brick pavement. The pavements of this city also are described because of the contrast between them and those in Cleveland in the matter of construction. Cleveland, with its sandy soil, omits the concrete foundation in a large percentage of its pavements, whereas such foundation is general in Columbus, where the soil is clayey. Cleveland uses Portland cement filler with a square-edged brick, while Columbus prefers tar filler and the round-edged brick. Taking the state of Ohio as a whole, we find in that state about one-fourth of all the brick pavement in the country.

In connection with stone blocks, the most interesting and important recent development is the effort to obtain closer joints and smoother surface. These have already been obtained in the use of sandstone blocks, since that stone can more easily be given a smooth surface than can the granite blocks used in the eastern states. The great merit of stone blocks is their durability, and the great objection to granite blocks is the noise and roughness. The cost of granite blocks, considering their durability, is probably less than that of any other pavement; in addition to which the nuisance and indirect loss occasioned by tearing up streets for repairing and repaving is largely avoided by the use of them. If the noise and roughness could be obviated or even greatly reduced it seems probable that all cities having heavy-traffic streets would use stone blocks for paving them. It is therefore to the interest of dealers in stone blocks, as well as to city officials and teamsters, to bring about such improvement, if possible. Where sandstone blocks can be obtained at reasonable cost they form probably the best pavement for heavy traffic streets; but the freight rates on such a heavy material as paving blocks limit the area over which they can be transported from the quarries and laid at a commercially practical cost. What Newark and a section of New York have done in the direction of securing more acceptable granite block pavements is recited elsewhere.

Certain requirements, especially smoothness and noiselessness with durability under a medium heavy traffic, are met most acceptably by treated wood block. The high cost of this pavement, however, undoubtedly retards its use very considerably. If this cost can be reduced by lowering the requirements or by bringing about more general competition, this will undoubtedly do much toward stimulating the more abundant use of this class of material.

Altogether the general tendency appears to be toward endeavoring to secure with a block pavement some or all of the advantages which have made asphalt so popular; at the same time retaining for each material its own peculiar advantages which adapt it to best meet a certain class of conditions.

Pavement Statistics

IN the tables presented with this issue will be found statistics concerning paving in all of the cities of the country of over 30,000 population and in many of those of less size. These data, it seems to us, will not only be of interest to those who are at all interested in street paving, but will also serve as a source of information concerning paving matters throughout the country which may be referred to from time to time as the desire for such information may arise. The first table is compiled from data collected and published by the Census Bureau and gives information for no later than 1907. (These data were not published until early this year.) The second table is prepared from information collected directly by ourselves and gives statistics up to date.

The figures in the latter table we believe to be correct and generally reliable. Unfortunately the same can not be said concerning the data published by the Census Bureau; and the information compiled from them must be used with caution. We, however, offer no apology for publishing it, since there is, we believe, no other collection of such data which is anything like so complete. As an illustration of the defects found in the Census data, it will be noticed that a number of cities have, according to these figures, laid several scores of miles of a given kind of pavement between 1903 and 1905, only to entirely remove them during the succeeding two years—something which, of course, did not occur, the apparent inconsistency being probably due to a misunderstanding of the questions by one of those who contributed the information. One source of confusion and consequent unreliability of figures is in the indefiniteness of the classification. It can not be told, for instance, whether sandstone block pavements were included by the ones who filled out the blank under the head of "Granite and Belgian Blocks" or under that of miscellaneous pavements. Also under the head "Wooden Block" is certainly included a large part of the old, fast disappearing cedar blocks of a generation ago; about 80 per cent of the wood block reported from Chicago being the old cedar blocks. Those not familiar with the facts might assume from the figures for the several years that modern wood block paving was in great disfavor and was being removed wholesale; whereas, as a matter of fact, this applies only to the old cedar blocks and not at all to the modern-treated wood block. These dubious figures, however, are few in number compared with the hundreds which are undoubtedly accurate; and to those who are familiar with such general facts as those just cited and can detect the inconsistencies, the table must, we believe, be of great value.

The figures collected by us show some interesting facts concerning the paving done in 1909. The cities listed contain, we believe, about half the pavements in the country, aside from macadam; certainly such a large percentage of those cities having more than 20,000 population are included as to give a very definite idea of what is being done in the way of permanent pavements. The figures show that last year, of permanent pavements sheet asphalt led with 246 miles, followed in order by brick, 191 miles; stone block, 58 miles; bituminous macadam, bituminous concrete, Bitulithic, etc., 38 miles; wood block, 26 miles; asphalt block, 21 miles; concrete (including Blome and Hassam), 9 miles. Also about 144 miles of macadam and 50 miles of gravel were laid in these cities, and 307 miles of road were treated with some kind of dust layer or other surface treatment. In obtaining these totals, square yards were reduced to miles by assuming all macadam, bituminous macadam and surface treatment to be 25 feet wide, and all other pavements 32 feet wide. County, state and other "good roads" would of course increase very greatly the amounts of macadam and gravel if added to these totals.

STANDARD PAVING SPECIFICATIONS

First Convention of "Organization of City Officials for Standardizing Paving Specifications"—Standard Specifications for Various Paving Materials

As stated last week in these columns, Mayor Busse, of Chicago, invited the Mayors, City Engineers, and other officials of all first-class cities to meet in Chicago during the week of Feb. 21st to discuss the matter of standardizing city specifications for various kinds of paving, especially creosoted wood block, brick and asphalt.

Of the 92 who were invited, 61 were present when the roll was called at noon on Monday, Feb. 21st, at the La Salle Hotel. There were present delegates from all first-class cities except Boston and Detroit. The Committee on Credentials, which was appointed, recommended that a special invitation be given to Prof. A. N. Talbot as a representative of the American Society of Municipal Improvements, and the courtesy of that particular session was extended to Messrs. Dow and Smith, of New York. All contractors and material men were invited to join the association as Associates.

The Committee on Credentials, Messrs. Andrew Rinker, City Engineer of Minneapolis; Otto Klein, Chief Engineer Commission of Accounts, New York; J. L. Darnell, City Engineer of Kansas City, Mo.; Geo. F. McGonagle, City Engineer of Salt Lake City, and John B. Hittell, Chief Engineer of Streets of Chicago, adopted as the basis for giving credentials the previous decision concerning this matter of the Chicago delegates who had considered the matter at the request of the Mayor. This was, that only accredited delegates be permitted to take part in the proceedings, but that the committees might permit such persons to appear before them as in their judgment might seem best. Also that only accredited delegates would be considered as guests of the city of Chicago on this occasion, but that consulting engineers, material men and employees of Chicago and other municipalities be permitted on the floor of the convention but not to take part in the proceedings. In order to limit the size of the convention no delegates were accepted from cities of less than 50,000 population, unless included in the original call.

At the first session, in addition to the Committee on Credentials a Committee on Organization was appointed of twelve members, with Mr. W. J. Hardee, City Engineer of New Orleans, as chairman. This committee met at 2.30 in the afternoon and later reported recommending that the organization be named the "Organization of City Officials for Standardizing Paving Specifications." That membership consist of regularly accredited cities, but that any person interested in the work of the organization may, on the recommendation of the Committee on Credentials and approval by the organization, be admitted as an Associate Member, but shall have no voice in the organization. That each city be entitled to one vote and that ten cities constitute a quorum; and that after the convention adjourns three members of a committee constitute a quorum. For officers they recommended a President, four Vice-Presidents, and a Secretary-Treasurer. Also that there be an Executive Committee comprising the officers of the organization and the chairman of each of the standing committees. That there be the following standing committees, each to consist of ten members during the convention and five members after adjournment: Credentials; Bonds, Guarantees and Uniform Bidding Blanks; Publication; Brick and Granite Block Paving Specifications; Cement, Concrete and Concrete Paving Specifications; Creosoted Wood Block Paving Specifications, and Macadam Specifications. The committee recommended that annual dues be paid by each city holding membership in the organization.

There were elected to the offices the following: President, Frank T. Fowler, Superintendent of Streets, Chicago; First Vice-President, Geo. W. Tillson, Engineer of Highways, New York; Second Vice-President, Capt. W. J. Hardee, City Engineer of New Orleans; Third Vice-President, L. W. Rundlett,

City Engineer of St. Paul, Minn; Fourth Vice-President, Geo. W. Craig, City Engineer of Omaha, Neb.; Secretary-Treasurer, John B. Hittell, Chief Engineer of Streets, Chicago. The committees appointed by the chair were as follows:

Creosoted Blocks.—Geo. W. Tillson, chairman, New York; Andrew Rinker, vice-chairman, Minneapolis; John MacVicar, Des Moines; Thos. F. McGilvray, Duluth; Albert F. Keeney, Chicago; Wm. F. Harvey, Chicago; Geo. S. Smith, New Orleans; H. L. Conway, Cincinnati; J. C. Travilla, St. Louis; W. J. Crocken, East St. Louis.

Bonds, Guarantees and Uniform Bidding Blanks.—W. J. Hardee, chairman, New Orleans; B. W. Snow, vice-chairman, Chicago; Chas. E. Norton, Grand Rapids; A. J. Grundman, Milwaukee; C. A. V. Standish, Chicago; R. T. Goodnow, Kansas City; Henry C. Allen, Syracuse; Felix A. Norden, Chicago; A. C. Kugle, Omaha; Swan Larson, South Omaha; Vincent J. Jozwiakowski, Chicago.

Cement, Concrete and Concrete Pavements.—J. H. Weatherford, chairman, Memphis; Abram Swan, Jr., vice-chairman, Trenton; L. A. Jansen, Milwaukee; C. D. Hill, Chicago; N. E. Murray, Chicago; D. C. Washburn, Aberdeen, S. D.; W. W. Reed, Green Bay; Otto H. Klein, New York; Mont Schuyler, St. Louis, Mo.

Asphalt and Bituminous Macadam.—Geo. W. Craig, chairman, Omaha; Wm. R. Benson, vice-chairman, Philadelphia; C. E. P. Babcock, Buffalo; L. W. Anderson, Grand Rapids; L. P. Scherer, Milwaukee; L. Kirschbraun, Chicago; G. W. Tonson, Toledo; L. W. Rundlett, St. Paul; Linn White, Chicago; G. F. McGonagle, Salt Lake City.

Brick and Granite.—B. T. Fendall, chairman, Baltimore; Morris Sherrerd, vice-chairman, Newark, N. J.; Henry Maetzel, Columbus; John C. Ely, Dayton; Edward H. Christ, Grand Rapids; John Minwegen, Chicago; J. O. Hooke, St. Louis; W. K. Seitz, St. Joseph; John B. Hittell, Chicago; M. F. McKenna, Bridgeport; A. N. Aldrich, Aberdeen, S. D.; A. N. Talbot, Urbana.

Macadam Pavements.—J. L. Darnell, chairman, Kansas City; Wm. H. Brooks, vice-chairman, Philadelphia; H. R. Peterman, St. Joseph; H. S. Richards, Chicago; Walter J. Leininger, Chicago; Ellis R. Dutton, Minneapolis; H. W. Klausmann, Indianapolis; Wm. Mungle, Newark, N. J.; Thos. P. Wriggins, Trenton.

In his opening address Mr. Frank T. Fowler stated that

> The thought of asking the endorsement of the idea of a Convention of American Municipalities looking toward the standardization of Street Paving was that a great step toward a rèduction in cost to the taxpayer would result; that the number of general kinds of pavement could be reduced; that delays now so frequent in obtaining materials would be reduced to a minimum, and, further, that any agreement on standards would result in heretofore unknown competition for our work by the public contractor.
>
> While it would not be practical, in my judgment, to urge a standardization of all materials in all cities with widely different climatic conditions, and where nearby markets afford other materials of satisfactory quality and price I feel a great advancement can be made by an interchange of our many experiences.

This work of organization occupied the opening session and an evening session of Feb. 21st. The next day, being a holiday, was devoted exclusively to committee work and entertainment.

The delegates invited to the convention consisted of the following, those having an asterisk before the name having been absent at the opening roll call.

Aberdeen, S. D.—A. N. Aldrich, Mayor; D. C. Washburn, City Engineer. *Baltimore, Md.*—B. T. Fendall, City Engineer. *Bridgeport, Conn.*—M. F. McKenna, City Engineer. *Buffalo, N. Y.*—Capt. Geo. H. Norton, Eng. Commissioner; Major Chas. E. P. Babcock, Assistant Engineer. *Chicago, Ill.*—B. J. Mullaney, Secy. to Mayor; *Ald. B. W. Snow, chairman Finance Committee; *Ald. Peter Reinberg, chairman Council Committee; *Ald. Geo. F. Harding, chairman Council Committee; *Ald. Dennis J. Egan, chairman Council Committee; Ald. Wm. H. Blencoe, chairman Council Committee; *John J. Hanberg, Commissioner Public Works; Frank T. Fowler, Supt. of Streets; Walter J. Leininger, Asst. Supt. of Streets; Albert F. Keeney, Pres. Board Local Improvements; John Minwegen, Board Local Improvements; Felix A. Norden, Board Local Improvements; Vincent J. Jozwiakowski, Board Local Improvements; *Chas. A. V. Standish, Secy. Board Local Improvements; C. D. Hill, Engineer Board Local Improvements; John B. Hittell, Chief Engineer of Streets; N. E. Murray, Supt. of Sidewalks; Lester Kirschbraun, Asphalt Chemist; W. F. Harvey, Asst. Engineer. *Cincinnati, Ohio.*—H. F. Shipley, City Engineer; Hugh L. Conway, Eng. S. & S. Repairs. *Cleveland, Ohio.*—*A. B. Lea, Dir. Public Service. *Columbus, Ohio.*—*Henry Maetzel, City Engineer; *H. S. Holden, Dir. Public Service. *Dayton, Ohio.*—*John C. Ely, Dir. Public Service; *Fred J. Cellarius, City Engineer. *Des Moines, Ia.*—John MacVicar, Supt. of Streets & Public Improvements; J. M. Burrows, Assistant Engineer; *Robert Brennan, City Solicitor. *Duluth, Minn.*—Thos. B. McGilvray, City Engineer. *Grand Rapids, Mich.*—*Louis W. Anderson, City Engineer; *Chas. E. Norton, member Bd. Public Wks.; Edward H. Christ, member Bd. Public Wks. *Green Bay, Wis.*—*Winifred Abrams, Mayor; *W. W. Reed, City Engineer. *Hartford, Conn.*—A. W. Dow, Con. Pav. Engineer; F. P. Smith, Con. Pav. Engineer. *Indianapolis, Ind.*—C. A. Schrader, Pres. Bd. Public Wks.; H. W. Klausmann. City Engineer. *Kansas City, Mo.*—Robert W. Goodnow, Secy. Board Public Works; J. L. Darnell, City Engineer; Fred W. Bingham, Asphalt Chemist. *Memphis, Tenn.*—J. H. Weatherford, City Engineer. *Milwaukee, Wis.*—*Chas. J. Poetsch, City Engineer; L. A. Jansen, Commissioner of Public Wks.; *A. J. Grundman, Commissioner of Public Wks. *Minneapolis, Minn.*—Andrew Rinker, City Engineer; Ellis R. Dutton, Asst. City Engineer. *Nashville, Tenn.*—*W. W. Southgate, City Engineer; *Patrick Cleary, Supt. of Streets; *E. L. Lewis, *Robert Creighton. *Newark, N. J.*—Morris Sherrerd, Chief Engineer Dept. Public Works; Wm. Mungler, Board of Public Works. *New Orleans, La.*—Geo. S. Smith, Commissioner of Public Wks.; Capt. W. J. Hardee, City Engineer. *New York, N. Y.*—Geo. W. Tillson, Chief Engineer, Bureau of Highways, Manhattan; Otto H. Klein, Chief Engineer, Commission of Accounts. *Omaha, Neb.*—Geo. W. Craig, City Engineer; A. C. Kugle, member City Council. *Peoria, Ill.*—*E. M. Woodruff, Mayor. *Philadelphia, Pa.*—Wm. R. Benson, Chief of Bureau of Highways; Wm. H. Brooks, Asst. Com. of Highways. *Pittsburg, Pa.*—*Jos. A. Armstrong, Director Dept. Public Wks.; H. S. Sprague, Supt. Bureau of Const. *St. Joseph, Mo.*—W. K. Seitz, Asst. City Engineer; H. R. Peterman, Asst. City Engineer. *St. Louis, Mo.*—James C. Travilla, Street Commissioner; Mr. Hooker, Asst. Sewer Commissioner; Mont Schuyler, Engineer of Tests. *St. Paul, Minn.*—L. W. Rundlett, City Engineer. *Salt Lake City, Utah.*—Geo. F. McGonagle, City Engineer. *Syracuse, N. Y.*—H. C. Allen, City Engineer. *Toledo, Ohio.*—Geo. W. Tonson, Chief Engineer. *Trenton, N. J.*—T. J. McGovern, Contractor; Abram Swan, Jr., City Engineer; Thos. P. Wiggins, chairman Street Committee. *Waukegan, Ill.*—*B. P. Thacker, Supt. Public Works. *Wilmington, Del.*—*Geo. W. Sparks, member S. & S. Dept.; *John G. Gray, member S. & S. Dept.; *Chas. Rudolph, member S. & S. Dept. *American Society of Municipal Improvements.*—*A. N. Talbot. *West Park Commissioners.*—*A. C. Schrader, Supt. & Engineer. *South Park Commissioners.*—*J. F. Foster, Superintendent; H. S. Richards, Asst. Supt.; Linn White, Engineer.

At the subsequent meetings were discussed various ideas suggested in connection with the proposed specifications, and this interchange of opinions and experiences was of the greatest interest and value to those present. So generally was this felt that it was decided to consider the organization as a permanent one, and an invitation extended by Mayor Gaynor to meet next year in New York was accepted, the date being set as January 10 to 14, 1911. An office for answering inquiries concerning the association and its specifications will be maintained in Chicago.

The immediate result of the convention was the adoption of specifications for wood block, granite block, asphalt and bituminous macadam pavements and for concrete foundations. We have space this week for the wood block specifications only. The committee held three half-day sessions, calling into consultation four companies manufacturing wood block and a fifth being represented informally. The committee recommended certain principles, believing that "these principles would be sufficient to enable any manufacturer to make a block that would conform to the specifications and at the same time permit the local engineer to adapt the same to conditions in his particular city."

TIMBER

The wood to be treated shall consist of long-leaf yellow pine, Norway pine, black gum and tamarack, only one kind of wood, however, to be used in any one contract.

Yellow pine blocks shall be cut from what is known as prime timber, namely, all timber must be sound commercial long-yellow pine, well manufactured, full size, saw butted, all square edge, and shall be free from the following defects; unsound, loose and hollow knots, worm holes and knot holes, through shakes and round shakes that show on the surface.

In yellow pine timber the annual rings shall average not less than six to the inch measured radially from the center of the heart.

Norway pine, black gum and tamarack blocks shall be cut from timber that is first class in every respect, and shall be of the same grade as that defined for the yellow pine.

SIZE OF BLOCKS

The blocks shall be from five to ten inches long, but shall average eight inches; they shall be three and one-half (3½) and four (4) inches in depth according to traffic; they shall be from three (3) to four (4) inches in width, but all blocks in one street or improvement shall be of uniform width, provided that on residential streets and in alleys blocks three inches deep can be used; provided further, that the width and depth of blocks shall in no case be equal.

A variation of 1/16 of an inch shall be allowed in the depth and ⅛ of an inch in the width of the blocks.

TREATMENT

The blocks shall be treated with a preservative oil elsewhere described, so that the pine and tamarack blocks shall contain not less than twenty (20) and the gum blocks not less than twenty-two (22) pounds per cubic foot.

OIL

The oil used shall be a coal tar product, free from adulteration of any kind whatever, and shall comply with the following requirements:

1. The specific gravity shall be at least 1.10 at a temperature of 38 degrees C.

2. Not more than three (3) per cent of the oil shall be insoluble by hot continuous extraction with benzol and chloroform.

3. On distillation, which shall be made exactly as described in Bulletin No. 65 of the American Railway Engineering and Maintenance of Way Association, the distillate shall not exceed two (2) per cent up to 150 degrees C. and 35 per cent up to 315 degrees C. The mean of three determinations to be taken.

The manufacturer of the oil shall permit full and complete inspection and sampling at the factory at which the oil is produced, of all materials, either crude or refined, entering into the manufacture of the finished product, as well as the finished product itself, in order that the materials used can be determined to be in accordance with the foregoing requirements. He shall also submit satisfactory proof of the origin of all materials entering into the composition of the finished product.

Oil samples taken by the inspector from the treating tank during progress of the work shall at no time be allowed to show an accumulation of more than 2 per cent of foreign matter, such as sawdust and dirt.

Due allowance shall be made for such accumulation of foreign matter by injecting an additional quantity of oil into the blocks.

CUSHION

The blocks shall be laid on a sand cushion one inch in thickness placed upon the concrete foundation.

FILLER

The joints between the blocks shall be filled with pitch or fine sand, the particular kind to be determined by the local authorities as conditions may demand.

EXPANSION JOINTS

An expansion joint shall be laid along the curb, and transverse joints one-half inch in width every fifty feet along the street, these joints to be filled with a bituminous composition, the necessity of the transverse joints to be determined by the local authorities, according to climatic conditions.

INSPECTION

The party manufacturing the blocks shall equip his plant with all the necessary gauges, appliances and facilities to enable the inspector to satisfy himself that the requirements of the specifications are fulfilled.

STREET ENCROACHMENTS

Laws and Ordinances in New York — Buildings Within Street Boundaries—Stoops, Bay Windows, Areaways — Basis of Awards—Rights of Abutters

THE Corporation Counsel of New York City a few weeks ago advised the Board of Estimate and Apportionment concerning the treatment of encroachments on public streets, either those which had for some time been under public control or those which were being acquired or accepted. In this he outlined the principles which he believed should govern the treatment of encroachments, and cited a number of court decisions which have been rendered in the matter. While these are based upon New York City ordinances and State laws, they are in general based upon common law, or laws which have their counterparts in many States and cities, and hence are of more or less general interest. The principles and decisions are given below, practically in full:

No awards should be made for structures erected on streets which have been dedicated to the public. It would seem that street opening proceedings are not authorized in such cases.

Awards need to be made for structures erected within private streets only where the owners have acquired an adverse right to their maintenance, or where there is no evidence that parties who could enforce their removal have not consented to their erection and maintenance. Except where an adverse right has been acquired these awards should be based not on the ordinary value of the structures, but on the probability of their being permitted to remain within the lines of the private street.

Ordinances permitting the erection of stoops, bay windows, area encroachments, etc., where such structures do not interfere with the public use of the street, or with the abutting owners' rights, have come, to a certain extent, to be considered as a species of revocable license to the continued existence thereof.

The privilege granted by such ordinances can be continued only so long as such encroachments do not interfere with the needs of the general public or with the rights of other owners to light, air and access.

In the cases where awards must be made for stoops, bay windows, area encroachments, etc., which are within ordinances that do not interfere with the public use of the street and do not violate other owners 'easements in the street, the awards should be based on the probability of the encroachments remaining.

Section 971 of the Charter was intended to operate at most only so long as the public needs do not require the street to its full width. It would be improper and illegal for the board of Estimate and Apportionment to agree with owners that their structures should remain in the street during the lifetime thereof, or for a definite period of time, particularly since some other owners might be deprived of the beneficial use of the lands, so occupied, notwithstanding the fact that they had paid assessments for the acquisition of such lands for the purpose of a street.

Where the encroachment is so slight as not to interfere with the general public rights in the street or with other property owners' rights, it is probable that an agreement might be made for its continued existence, if the owner would waive payment in consideration thereof.

Where substantial awards must be made for the land on which the structure stands and for the structure, instead of making an agreement as to the retention of the structure, it would be preferable either to change the lines of the street by shifting the lines thereof or by reducing its width, or else paying the proper awards and seeing that the city obtains the rights for which payment is made.

The Court decisions referred to, briefly stated, are as follows:

Abutting owners on a private street have a right of user of the entire width of the street and may remove encroachments thereon, and awards should be based on the existence of such rights. Awards to the owner of encroachments on private streets would only have to be made where the remaining owners had consented thereto, and the burden is on the city to show the contrary, or where an adverse right to use the lands for such purpose had been acquired. Except where an adverse right has been acquired, the awards should be based, not on the ordinary value of the structures, but on the probability of their being permitted to remain within the limits of the private street.

The Legislature has authority to authorize structures in the street which do not interfere with the public use or violate private rights. This power may be delegated to the governing body of a municipal corporation.

The possibility of the city molesting an owner who has erected bay windows and stoops under city ordinances which do not interfere with the public use or violate private rights is so exceedingly remote that an objection to taking title to the property based on the existence of such structures, to which they are appurtenant, becomes technical only and not substantial.

The municipality may withdraw from the use of the general public a portion of the street so long as it does not violate the contract under which the street was acquired, and providing it acts within constitutional limits and either under express legislative authority or in the exercise of the inherent right residing in it for controlling the use of its streets for the purposes for which they were dedicated.

The title of the streets of the City of New York is in trust for a public use and not even a municipal assembly has authority to permit such permanent encroachments thereon as a main wall of a permanent and substantial structure three feet six inches into and beyond the line of the street.

The Legislature cannot authorize the condemnation of property for other than a public use.

The consent of the city to the use of streets for private purposes is always subject to the right of the public whenever required for public purposes.

Ordinances relating to sidewalks and streets containing prohibition of encroachments do not authorize the city to give permission to an owner of property to erect a portion of the main part of his building on a public highway.

If authorized by ordinances which do not interfere with public or private rights, owners may construct and maintain steps within a highway, and areaways for light, air and access to the basement or cellar, these being uses properly made of the public street, but all such privileges may be withdrawn without compensation.

AMOUNT OF PAVEMENT IN UNITED STATES CITIES

City	COBBLE STONE						GRANITE AND BELGIAN BLOCK						BRICK					
	Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between	
		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907
New York, N. Y.	614,501	35.1	79.2	155.1	−75.9	−44.1	8,084,739	394.4	400.8	430.0	−29.2	−6.4	381,789	19.8	18.7	12.1	6.6	1.1
Chicago, Ill.							922,400	57.7	47.0	40.7	6.3	10.7	1,524,960	95.3	87.0	75.5	11.5	8.3
Philadelphia, Pa.	1,827,870	57.3	61.4	73.1	−11.7	−4.1	6,438,282	393.0	388.1	367.8	20.3	4.9	2,377,433	150.9	145.7	141.7	4.0	5.2
St. Louis, Mo.							2,572,419	142.2	71.7	141.0	−69.3	70.5	2,617,269	209.6	137.0	89.5	47.5	72.6
Boston, Mass.	2,212	0.3	0.3	0.5	−0.2	0.0	2,158,673	96.5	96.3	92.8	3.5	0.2	4,070	0.4	0.4	0.4	0.0	0.0
Baltimore, Md.	5,084,213	366.4	371.9	373.1	−1.2	−5.5	857,069	43.7	43.0	43.1	−0.1	0.7	156,690	8.9	6.1	4.9	1.2	2.8
Pittsburg, Pa.	422,567	27.6	31.7	54.2	−22.5	−4.1	3,380,670	216.4	201.0	142.4	58.6	15.4	492,378	32.6	19.3	15.4	3.9	13.3
Cleveland, Ohio.							1,932,480	93.3	91.5	87.9	3.6	1.8	2,957,328	207.1	168.0	117.6	50.4	39.1
Buffalo, N. Y.	1,404,363	80.4	82.8	87.4	−4.6	−2.4	281,748	14.4	13.4	9.6	3.8	1.0	323,482	21.0	14.5	12.7	1.8	6.5
San Francisco, Cal.	308,880	13.0	13.0	12.5	0.5	0.0	2,416,216	102.1	100.0	94.7	5.3	2.1						
Detroit, Mich.	19,813	1.0	1.3	1.0	0.3	−0.3	84,489	3.8	3.6	4.1	−0.5	0.2	1,553,671	74.2	48.4	36.9	11.5	25.8
Cincinnati, Ohio.	1,002,125	64.3	63.4	64.3	−0.9	0.9	1,184,761	60.4	56.5	48.5	8.0	3.9	1,165,630	66.5	60.0	55.0	5.0	6.5
Milwaukee, Wis.				74.5	−74.5		1,054,910	97.7	88.5	9.0	79.5	9.2	338,097	13.6	10.6	6.9	3.7	3.0
New Orleans, La.	537,856	38.2	38.2	38.2	0.0	0.0	364,672	25.9	25.9	25.9	0.0	0.0	93,338	6.5	6.0	6.0	0.0	0.5
Washington, D. C.	165,356	7.2	8.4	10.3	−1.9	−1.2	474,248	25.4	25.9	26.7	−0.8	−0.5	22,415	0.9	0.9	0.9	0.0	0.0
Newark, N. J.	154,407	7.3	8.9	10.4	−1.5	−1.6	1,398,677	66.2	63.5	59.5	4.0	2.7	514,435	24.4	14.3	9.8	4.5	10.1
Minneapolis, Minn.	311,117	19.7				19.7	258,538	16.3	31.1	21.9	9.2	−14.8	338,030	21.3	[1]19.1	13.2	5.9	2.2
Jersey City, N. J.							1,353,543	80.0	79.6	78.0	1.6	0.4	3,380	0.2	0.2	0.1	0.1	0.0
Louisville, Ky.	[1]263,228	11.9	8.4	12.7	−4.3	3.5	[1]389,312	17.6	47.5	41.0	6.5	−29.9	[1]1,862,504	84.2	69.0	63.5	5.5	15.2
Indianapolis, Ind.													750,068	52.3	36.8	30.4	6.4	15.5
St. Paul, Minn.							248,773	8.8	7.9	6.4	1.5	0.9	219,325	10.8	10.2	9.4	0.8	0.6
Providence, R. I.	88,232	3.4	5.1	5.1	0.0	−1.7	580,976	27.1	31.4	30.6	0.8	−4.3	7,392	0.7	0.4	0.4	0.0	0.3
Rochester, N. Y.	15,874	0.5	0.8	1.0	−0.2	−0.3	679,396	31.5	2.4	31.1	−28.7	29.1	645,454	36.4	18.6	10.0	8.6	17.8
Kansas City, Mo.							19,351	3.2		2.2		[1]1.0	385,300	61.1	40.9	39.9	1.0	20.2
Toledo, Ohio	45,090	2.6				2.6	425,745	21.8	25.0	25.1	−0.1	−3.2	1,695,498	94.9	83.6	69.6	14.0	11.3
Denver, Colo.							76,758	5.0	37.8	2.7	35.1	−32.8	4,154	0.4	0.4	0.4	0.0	0.0
Columbus, Ohio.	50,450	4.3	8.9	8.9	0.0	−4.6	198,516	8.8	9.6	9.6	0.0	−0.8	1,800,542	99.6	84.6	78.5	6.1	15.0
Los Angeles, Cal.							30,507	1.3	1.3	1.3	0.0	0.0	21,972	0.9	0.6	0.5	0.1	0.3
Worcester, Mass.	447	[3]		[3]			266,570	11.4	12.0	11.4	0.6	−0.6	9,464	0.5	0.3	0.2	0.1	0.2
Seattle, Wash.							56,262	3.9				3.9	217,350	8.7	5.9	4.8	1.1	2.8
Memphis, Tenn.	52,800	4.5		[2]		4.5	324,000	12.3	12.3	11.3	1.0	0.0	108,473	4.5	5.2	5.2	0.0	−0.7
Omaha, Neb.							543,734	21.3	25.5	25.2	0.3	−4.2	475,608	24.1	16.6	13.5	3.1	7.5
New Haven, Conn.	3,816	0.1	0.1	0.1	0.0	0.0	89,810	4.1	4.2	4.2	0.0	−0.1	143,579	6.5	6.5	6.5	0.0	0.0
Scranton, Pa.	25,000	2.0	2.0	3.2	−1.2	0.0	35,439	2.3	2.0	1.5	0.5	0.3	104,228	5.6	5.6	5.0	0.6	0.0
Syracuse, N. Y.							81,548	1.7	1.7	1.7	0.0	0.0	467,678	21.5	17.7	13.7	4.0	3.8
St. Joseph, Mo.							19,294	1.4	0.6	1.1	−0.5	0.8	532,467	33.5	19.9	15.7	4.2	13.6
Paterson, N. J.	13,610	0.6	1.4	1.4	0.0	−0.8	99,080	4.7	4.2	4.3	−0.1	0.5	137,207	6.5	7.8	5.9	1.9	−1.3
Portland, Ore.							111,556	5.3	5.5	4.5	1.0	−0.2	26,126	1.2	1.1	0.6	0.5	0.1
Atlanta, Ga.							1,129,685	48.1	48.1	48.8	−0.7	0.0	35,200	2.0	2.0	2.0	0.0	0.0
Richmond, Va.			3.5	[2]		−3.5	[1]1,096,280	43.5	41.0	[2]		2.5				[2]		
Fall River, Mass.	37,511	2.0	0.6	0.6	0.0	1.4	216,373	10.8	11.0	9.5	1.5	−0.2						
Nashville, Tenn.							126,180	7.2	7.2	5.6	1.6	0.0	41,467	2.4	2.4	2.4	0.0	0.0
Dayton, Ohio.				94.0	−94.0		20,466	1.1	1.0	1.6	−0.6	0.1	576,714	27.8	30.2	13.9	16.3	−2.4
Grand Rapids, Mich.	10,960	0.6	0.8	0.8	0.0	−0.2	4,960	0.3				0.3	339,570	17.5	13.0	8.7	4.3	4.5
Cambridge, Mass.							233,323	9.5	7.8	6.9	0.9	1.7	82,941	3.6	3.3	2.3	1.0	0.3
Albany, N. Y.	210,205	11.9	14.1	18.4	−4.3	−2.2	561,498	31.9	31.8	31.5	0.3	0.1	484,117	27.5	24.5	20.0	4.5	3.0
Hartford, Conn.							12,810	0.5	0.6	0.6	0.0	−0.1						
Lowell, Mass.							273,328	15.5	15.4	15.4	0.0	0.1	3,115	0.2	0.8	[2] 0.2	0.6	−0.6
Reading, Pa.	124,765	6.2	6.3	6.3	0.0	−0.1	7,333	0.5	0.5	0.5	0.0	0.0	284,237	14.2	10.0		10.0	4.2
Trenton, N. J.				0.6	−0.6		74,821	3.8	2.6	6.1	−3.5	1.2	186,146	10.0	9.2	8.6	0.6	0.8
Bridgeport, Conn.							27,717	1.1	1.0	1.6	−0.6	0.1	71,071	3.4	3.6	2.3	1.3	−0.2
Wilmington, Del.	188,936	10.7	10.7	10.7	0.0	0.0	203,785	12.0	12.0	11.5	0.5	0.0	226,981	14.6	14.5	14.1	0.4	0.1
Camden, N. J.	52,800	3.6	4.6	4.6	0.0	−1.0	240,533	16.4	30.2	29.1	1.1	−13.8	36,667	2.5	2.5	2.5	0.0	0.0
Des Moines, Iowa.													1,083,449	70.2	70.6	63.6	7.0	−0.4
Kansas City, Kan.							5,228	0.1	0.1	0.1	0.0	0.0	895,682	48.6	47.9	33.1	14.8	0.7
Lynn, Mass.							92,225	3.8	3.8	3.8	0.0	0.0	2,740	0.1	0.1	0.2	−0.1	0.0
New Bedford, Mass.	167,600	13.3	13.3	13.7	−0.4	0.0	66,957	5.0	5.0	4.7	0.3	0.0	9,276	0.3	0.3	0.3	0.0	0.0
Springfield, Mass.				[2]			37,513	2.2	2.1	2.4	−0.3	0.1	85,666	4.4	4.4	3.7	0.7	0.0
Troy, N. Y.							455,199	25.9	26.3	26.2	0.1	−0.4	261,916	14.9	13.0	12.8	0.2	1.9
Oakland, Cal.																		
Lawrence, Mass.							106,537	4.6	3.2	3.1	0.1	1.4	10,648	0.6				0.6
Somerville, Mass.							63,300	2.7	2.8	2.8	0.0	−0.1	5,640	0.2	0.2	0.1	0.1	0.0
Savannah, Ga.	150,032	7.6	7.6	7.8	−0.2	0.0	81,852	3.8	3.8	2.1	1.7	0.0	311,198	14.9	14.7	8.2	6.5	0.2
Duluth, Minn.							60,385	2.5		1.5		[1]1.0	48,910	1.5	1.5	1.5	0.0	0.0
Norfolk, Va.	39,767	3.0	3.2	3.2	0.0	−0.2	316,232	19.0	13.9	13.2	0.7	5.1	32,858	2.0	2.0	2.5	−0.5	0.0
Hoboken, N. J.							296,551	16.6	23.4	16.2	7.2	−6.8						
Peoria, Ill.	9,514	0.5	0.5	0.6	−0.1	0.0	7,777	0.6	0.6	0.5	0.1	0.0	786,043	38.8	33.1	30.2	2.9	5.7
Yonkers, N. Y.	1,283	0.1	0.1	0.1	0.0	0.0	49,887	2.7	2.4	2.5	−0.1	0.3	4,666	0.2	0.2	0.2	0.0	0.0
Utica, N. Y.	16,603	0.8	0.2	2.1	−1.9	0.6	110,752	5.3	5.2	5.3	−0.1	0.1	68,271	0.4	0.4	0.4	0.0	0.0
Manchester, N. H.	4,400	0.3	0.3	0.3	0.0	0.0	108,600	4.3	4.0	2.9	1.1	0.3						
Schenectady, N. Y.	27,972	1.9	1.9	2.4	−0.5	0.0	30,312	1.5	1.2	1.0	0.2	0.3	86,782	5.2	5.2	5.0	0.2	0.0
Evansville, Ind.	5,280	0.2	0.2	0.2	0.0	0.0							606,247	26.2	23.0	25.5	−2.5	3.2
San Antonio, Tex.													8,946	0.5	0.5	0.1	0.4	0.0
Elizabeth, N. J.	2,323	0.1	0.1	0.1	0.0	0.0	428,097	20.3	14.8	17.7	−2.9	5.5	11,616	0.6	0.5	0.5	0.0	0.1
Waterbury, Conn.				0.1	−0.1		47,592	2.3	2.9	2.4	0.5	−0.6	40,284	2.3	2.2	1.7	0.5	0.1
Salt Lake City, Utah							64,162	2.4	2.2		2.2	0.2						
Wilkes-Barre, Pa.				7.6	−7.6		17,600	1.0	1.7	1.7	0.0	−0.7	351,996	20.0	15.9	8.3	7.6	4.1
Erie, Pa.	82,962	4.9	4.8		4.8	0.1				4.8	−4.8		316,042	14.0	12.5	12.9	−0.4	1.5
Houston, Texas.							1,892	0.9	0.9		0.9	0.0	295,930	15.3	11.0	9.8	1.2	4.3
Tacoma, Wash.							79,950	3.2				3.2	82,143	3.0	1.2	0.6	0.6	1.8

City	COBBLE STONE						GRANITE AND BELGIAN BLOCK						BRICK					
	Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between	
		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907
Harrisburg, Pa.													30,261	2.6	2.4	0.5	1.9	0.2
Charleston, S. C.	138,034	3.0	3.1	3.7	−0.6	−0.1	257,013	17.3	17.2	17.1	0.1	0.1	39,462	2.4	2.1	0.4	1.7	0.3
Portland, Maine	13,015	0.7	0.7	0.8	−0.1	0.0	261,229	13.4	12.2	11.2	1.0	1.2	3,444	0.2				0.2
Youngstown, Ohio							38,204	1.2	0.9	0.9	0.0	0.3	268,436	15.3	3.7	2.5	1.2	11.6
Dallas, Texas													55,435	2.7	1.0	0.8	0.2	1.7
Terre Haute, Ind.													372,031	17.7	10.9	5.6	5.3	6.8
Fort Wayne, Ind.			0.1	0.1	0.0	−0.1							339,057	18.9	16.1	16.3	−0.2	2.8
Akron, Ohio							43,182	2.2	2.2	0.8	1.4	0.0	623,123	35.4	29.4	24.8	4.6	6.0
Holyoke, Mass.							[1]46,464	2.6	2.8	2.6	0.2	−0.2	[12]36,608	2.1	1.7	1.8	−0.1	0.4
Brockton, Mass.							[4]152,568	8.0	8.0	8.4	−0.4	0.0						
Covington, Ky.													[1]234,780	[1]15.0	6.2	3.5	2.7	8.8
Saginaw, Mich.	52,993	3.5	3.2	4.7	−1.5	0.3							295,200	18.2	14.0	9.8	4.2	4.2
Lincoln, Neb.										1.4	−1.4		522,053	16.8	16.4	14.8	1.6	0.4
Altoona, Pa.	1,576	0.1	0.1	0.1	0.0	0.0	14,214	0.9	1.0	0.9	0.1	−0.1	142,961	9.3	1.7	1.1	0.6	7.6
Spokane, Wash.													8,566	0.3	0.5	0.5	0.0	−0.2
Lancaster, Pa.							22,531	1.4	1.5	1.5	0.0	−0.1	105,959	6.7	5.0	3.5	1.5	1.7
Birmingham, Ala.							61,025	2.0	2.0	2.0	0.0	0.0	202,963	5.6	3.0	2.0	1.0	2.6
Bayonne, N. J.							62,250	2.8	2.8	2.5	0.3	0.0	19,546	1.0				1.0
South Bend, Ind.			0.1	0.1	0.0	−0.1							859,587	41.0	32.9	26.5	6.4	8.1
Butte, Mont.							75,187	2.7	2.6	2.5	0.1	0.1						
Pawtucket, R. I.							90,815	5.4	5.7	5.7	0.0	−0.3	1,965	0.1	0.1	0.1	0.0	0.0
McKeesport, Pa.							92,400	5.6	5.6	5.7	−0.1	0.0	325,792	23.2	22.0	16.2	5.8	1.2
Binghamton, N. Y.										0.1	−0.1		202,227	8.8	6.5	5.2	1.3	2.3
Johnstown, Pa.	126,722	5.4	5.6	8.5	−2.9	−0.2							382,512	16.3	13.0	10.2	2.8	3.3
Dubuque, Iowa			0.8	0.8	0.0	−0.8							138,370	6.8	5.0	5.1	−0.1	1.8
Sioux City, Iowa													157,723	7.4	7.7	7.5	0.2	−0.3
Augusta, Ga.							50,391	2.4	2.0	2.0	0.0	0.4	81,627	2.6	1.8	0.1	1.7	0.8
Mobile, Ala.							26,590	0.8	0.8		0.8	0.0	73,524	4.0	4.0	1.2	2.8	0.0
Topeka, Kan.							102,315	3.5	3.5	3.5	0.0	0.0	635,179	31.1	28.8	21.1	7.7	2.3
Springfield, Ohio							15,640	0.6	0.6	0.6	0.0	0.0	234,667	10.0	8.7	7.0	1.7	1.3
Allentown, Pa.													26,208	0.3	0.2	0.4	−0.2	0.1
East St. Louis, Ill.							[1]65,472	3.1	3.1	1.9	1.2	0.0	[11]1,015,509	32.3	29.0	19.4	9.6	3.3
Wheeling, W. Va.	58,905	3.4	10.0	7.0	3.0	−6.6	933	0.1				0.1	432,192	24.4	22.8	27.0	−4.2	1.6
Montgomery, Ala.							78,155	2.2	2.2	2.2	0.0	0.0	162,678	5.0	4.7	4.7	0.0	0.3
Passaic, N. J.							16,193	0.8	0.3	1.7	−1.4	0.5	3,000	0.2				0.2
Davenport, Iowa													939,530	39.0	35.0	30.4	4.6	4.0
Atlantic City, N. J.													42,240	4.0	3.2	1.9	1.3	0.8
Little Rock, Ark.							16,896	0.7	0.8	0.8	0.0	−0.1	114,705	6.1	4.0	2.1	1.9	2.1
Bay City, Mich.	3,064	0.3		0.7		[4]−0.4							254,946	16.3	15.4	7.8	7.6	0.9
York, Pa.													53,000	3.0	3.0	3.0	0.0	0.0
Malden, Mass.							22,335	0.9	0.9	0.7	0.2	0.0	1,665	0.1	0.1	0.1	0.0	0.0
Springfield, Ill.													984,630	42.8	27.1	28.1	−1.0	15.7
Quincy, Ill.													564,637	25.5	23.1	23.1	0.0	2.4
Canton, Ohio													361,410	19.9	19.0	18.4	0.6	0.9
Superior, Wis.	15,441	0.4				0.4				[3]			4,211	0.4				0.4
Chester, Pa.	21,120	1.2	1.2	1.5	−0.3	0.0	73,920	4.2	4.2	7.3	−3.1	0.0	48,048	2.7	2.7	2.7	0.0	0.0
Chelsea, Mass.							89,760	5.1	4.6	3.6	1.0	0.5	15,840	0.9	0.5	0.7	−0.2	0.4
South Omaha, Neb.									1.9	2.4	−0.5	−1.9	219,800	8.3	5.0	0.9	4.1	3.3
Newcastle, Pa.													219,040	12.4	8.2	5.5	2.7	4.2
Salem, Mass.							35,639	5.0	8.0	14.0	−6.0	−3.0						
Newton, Mass.																		
Haverhill, Mass.							86,540	3.9	3.0	3.8	−0.8	0.9						
Jacksonville, Fla.													482,064	27.4	14.1	11.2	2.9	13.3
Joplin, Mo.													113,568	4.1	2.9	1.8	1.1	1.2
Wichita, Kan.									1.2	1.2	0.0	−1.2	68,560	2.7	1.2	0.4	0.8	1.5
Rockford, Ill.													60,553	1.9	1.9	1.9	0.0	0.0
Knoxville, Tenn.													81,447	4.5	3.5	3.0	0.5	1.0
Elmira, N. Y.							29,634	1.4	1.3	1.3	0.0	0.1	82,832	3.6	3.7	4.1	−0.4	−0.1
Galveston, Texas													143,450	4.1	4.0	2.1	1.9	0.1
New Britain, Conn.																		
Chattanooga, Tenn.							57,298	2.2	2.2	2.2	0.0	0.0	90,872	4.3	4.0	4.0	0.0	0.3
Kalamazoo, Mich.													190,357	9.0	5.4	3.0	2.4	3.6
Woonsocket, R. I.	[1]800	[2]	0.1		0.1	−0.1	13,801	0.8	0.3	0.7	−0.4	0.5	9,485	0.5	0.3		0.3	0.2
Fitchburg, Mass.	[1]7,680	0.5	0.5	0.5	0.0	0.0	[1]95,920	5.4	5.4	4.7	0.7	0.0						
Racine, Wis.							26,687	0.9	0.9	1.1	−0.2	0.0	137,028	7.9	7.6	4.5	3.1	0.3
Auburn, N. Y.										0.5	−0.5		25,622	1.0	0.9	0.9	0.0	0.1
Macon, Ga.							59,456	3.2	3.1		3.1	0.1	32,099	2.3	3.1		3.1	−0.8
Joliet, Ill.													90,996	4.3	3.7	3.8	−0.1	0.6
Oklahoma City, Okla.													65,000	2.3				2.3
Oshkosh, Wis.													[1]47,167	[12]1.1	1.2	0.8	0.4	0.9
West Hoboken, N. J.							166,760	8.9		4.8		[4]4.1	50,820	2.7				2.7
Sacramento, Cal.	11,128	0.9	1.5	1.5	0.0	−0.6	23,816	1.2	1.0	1.0	0.0	0.2						
Pueblo, Col.																		
Everett, Mass.							10,000	0.4		0.3		[4]0.1						
Taunton, Mass.	1,584	0.1	0.1	0.1	0.0	0.0	67,350	4.3	4.3	4.0	0.3	0.0						
Newport, Ky.													142,940	8.0		3.8		[4]4.2
La Crosse, Wis.													140,565	6.4	5.6	3.8	1.8	0.8
Fort Worth, Tex.													[1]58,688	[12]0.0				2.0
Total	13,998,802	834.9	887.1	1,191.3	−304.2	−52.2	48,701,436	2,583.3	2,508.9	2,339.0	169.9	74.4	46,224,419	2,583.2	2,075.0	1,683.9	508.2	391.1
Percentage gain					−25.5	−0.6					7.3	3.0					30.0	19.0

[1] Estimated. [2] Not reported. [3] Less than one-tenth mile. [4] Between 1903 and 1907. [12] Included in unpaved streets.

City	WOOD BLOCK						ASPHALT AND ASPHALT BLOCK						BITUMINOUS MACADAM					
	Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between	
		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907
New York, N. Y.	361,458	16.7	9.7	0.9	8.8	7.0	14,012,176	714.5	595.6	436.7	158.9	118.9	9,809	0.6	.....	.....	.....	0.6
Chicago, Ill.	7,900,480	493.8	581.0	665.2	−84.2	−87.2	6,638,088	401.9	269.0	197.2	71.8	132.9	.....	.....	.....	.....	.....	.....
Philadelphia, Pa.	.....	.....	.....	.....	.....	.....	6,267,151	409.9	379.7	357.0	22.7	30.2	72,726	12.8	.....	.....	.....	12.8
St. Louis, Mo.	55,554	2.9	2.6	3.3	−0.7	0.3	1,255,873	52.6	41.9	28.3	13.6	10.7	785,061	30.6	20.4	.....	.....	10.2
Boston, Mass.	44,073	1.8	0.9	0.9	0.0	0.9	332,024	21.7	21.2	20.3	0.9	0.5	115,075	6.1	5.0	.....	.....	1.1
Baltimore, Md.	35,109	1.7	0.6	0.1	0.5	1.1	635,944	26.7	22.5	20.9	1.6	4.2	72,605	3.1	.....	.....	.....	3.1
Pittsburg, Pa.	.....	.....	.....	.....	.....	.....	2,764,690	177.4	160.2	140.0	20.2	17.2	.....	.....	.....	.....	.....	.....
Cleveland, Ohio.	19,888	1.1	1.1	0.1	1.0	0.0	403,040	24.4	22.9	17.4	5.5	1.5	13,728	1.0	0.8	.....	.....	0.2
Buffalo, N. Y.	.....	.....	.....	.....	.....	.....	4,205,858	234.8	228.3	232.8	−4.5	6.5	.....	.....	.....	.....	.....	.....
San Francisco, Cal.	.....	.....	.....	0.1	−0.1	.....	3,288,042	137.7	124.0	114.0	10.0	13.7	.....	.....	.....	.....	.....	.....
Detroit, Mich.	3,649,610	211.8	220.7	235.4	−14.7	−8.9	1,097,991	55.2	42.1	33.9	8.2	13.1	5,251	0.3	0.3	.....	.....	0.0
Cincinnati, Ohio.	.....	.....	.....	.....	.....	.....	712,688	40.8	35.3	30.0	5.3	5.5	.....	.....	.....	.....	.....	.....
Milwaukee, Wis.	764,029	29.4	34.5	41.1	−6.6	−5.1	648,239	22.3	22.4	20.3	2.1	−0.1	16,953	1.3	.....	.....	.....	1.3
New Orleans, La.	.....	.....	.....	.....	.....	.....	876,270	42.7	31.4	26.3	5.1	11.3	.....	.....	.....	.....	.....	.....
Washington, D. C.	.....	.....	.....	.....	.....	.....	3,862,336	169.8	163.5	157.3	6.2	6.3	.....	.....	.....	.....	.....	.....
Newark, N. J.	1,584	0.1	0.1	0.1	0.0	0.0	1,082,451	51.2	51.3	51.1	0.2	−0.1	121,122	5.7	2.0	.....	.....	3.7
Minneapolis, Minn.	551,258	34.8	[1]34.2	46.4	−12.2	0.6	164,447	10.4	[1]11.7	12.4	−0.7	−1.3	.....	.....	.....	.....	.....	.....
Jersey City, N. J.	.....	.....	.....	.....	.....	.....	413,193	23.7	17.1	16.2	0.9	6.6	.....	.....	.....	.....	.....	.....
Louisville, Ky.	.....	.....	.....	.....	.....	.....	[1]754,292	34.1	33.1	24.2	8.9	1.0	.....	.....	.....	.....	.....	.....
Indianapolis, Ind.	387,571	21.0	19.7	17.5	2.2	1.3	1,202,893	56.7	49.6	48.3	1.3	7.1	103,727	7.0	.....	.....	.....	7.0
St. Paul, Minn.	13,089	0.8	2.6	.....	2.6	−1.8	662,548	29.3	28.4	25.4	3.0	0.9	.....	.....	.....	.....	.....	.....
Providence, R. I.	.....	.....	.....	.....	.....	.....	89,760	3.7	5.1	4.9	0.2	−1.4	.....	.....	.....	.....	.....	.....
Rochester, N. Y.	17,377	0.7	0.7	.....	0.7	0.0	968,565	61.0	55.1	50.2	4.9	5.9	20,800	1.0	.....	.....	.....	1.0
Kansas City, Mo.	7,087	0.2	.....	0.1	−0.1	0.2	3,058,411	180.2	148.4	122.7	25.7	31.8	19,627	1.4	0.1	.....	.....	1.3
Toledo, Ohio.	128,563	6.1	6.5	10.0	−3.5	−0.4	454,987	24.4	25.0	22.9	2.1	−0.6	34,933	1.5	.....	.....	.....	1.5
Denver, Colo.	.....	.....	.....	.....	.....	.....	515,760	20.1	19.7	19.1	0.6	0.4	.....	.....	.....	.....	.....	.....
Columbus, Ohio.	.....	.....	.....	.....	.....	.....	494,729	21.9	18.9	18.2	0.7	3.0	2,151	0.2	.....	.....	.....	0.2
Los Angeles, Cal.	.....	.....	.....	.....	.....	.....	941,739	40.1	23.4	13.7	9.7	16.7	.....	.....	.....	.....	.....	.....
Worcester, Mass.	531	[3]	.....	.....	.....	.....	12,698	0.7	0.7	0.7	0.0	0.0	30,082	1.8	1.8	.....	.....	0.0
Seattle, Wash.	3,133	0.1	0.1	0.3	−0.2	0.0	607,771	47.9	27.5	13.3	14.2	20.4	.....	.....	.....	.....	.....	.....
Memphis, Tenn.	.....	.....	.....	.....	.....	.....	286,167	10.5	12.1	6.1	6.0	−1.6	.....	.....	.....	.....	.....	.....
Omaha, Neb.	172,287	7.4	8.0	11.4	−3.4	−0.6	1,015,965	44.3	39.4	35.7	3.7	4.9	.....	.....	.....	.....	.....	.....
New Haven, Conn.	947	0.1	.....	.....	.....	0.1	69,349	3.3	3.3	3.3	0.0	0.0	.....	.....	.....	.....	.....	.....
Scranton, Pa.	.....	.....	.....	.....	.....	.....	277,361	13.9	13.2	12.5	0.7	0.7	25,826	1.7	0.8	.....	.....	0.9
Syracuse, N. Y.	.....	.....	.....	.....	.....	.....	718,956	38.1	30.8	32.3	−1.5	7.3	3,767	0.2	.....	.....	.....	0.2
St. Joseph, Mo.	.....	.....	.....	.....	.....	.....	246,779	8.5	9.1	7.8	1.3	−0.6	13,053	1.1	.....	.....	.....	1.1
Paterson, N. J.	4,700	0.5	.....	.....	.....	0.5	108,019	5.1	6.1	3.5	2.6	−1.0	.....	.....	.....	.....	.....	.....
Portland, Ore.	41,121	2.0	2.2	1.9	0.3	−0.2	182,477	8.6	4.9	4.6	0.3	3.7	277,052	13.1	4.5	.....	.....	8.6
Atlanta, Ga.	7,040	0.3	0.3	0.3	0.0	0.0	167,895	7.1	7.0	5.7	1.3	0.1	54,600	2.2	0.7	.....	.....	1.5
Richmond, Va.	.....	.....	.....	.....	.....	.....	[1]206,748	6.9	3.8	[2]	3.8	3.1	.....	.....	.....	.....	.....	.....
Fall River, Mass.	.....	.....	.....	.....	.....	.....	7,622	0.4	0.4	0.1	0.3	0.0	.....	.....	.....	.....	.....	.....
Nashville, Tenn.	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.5	−0.5	.....	116,669	6.6	6.6	.....	.....	0.0
Dayton, Ohio.	.....	.....	.....	.....	.....	.....	447,445	21.6	17.3	17.8	−0.5	4.3	15,230	0.8	1.0	.....	.....	−0.2
Grand Rapids, Mich.	55,330	2.9	4.2	8.7	−4.5	−1.3	136,160	7.0	7.3	7.0	0.3	−0.3	26,420	1.4	.....	.....	.....	1.4
Cambridge, Mass.	.....	.....	.....	.....	.....	.....	5,315	0.2	0.2	0.2	0.0	0.0	53,723	2.2	1.3	.....	.....	0.9
Albany, N. Y.	.....	.....	.....	.....	.....	.....	187,594	10.7	10.7	9.5	1.2	0.0	.....	.....	.....	.....	.....	.....
Hartford, Conn.	1,594	0.2	0.2	0.1	0.1	0.0	199,875	8.7	8.7	8.7	0.0	0.0	.....	.....	.....	.....	.....	.....
Lowell, Mass.	4,506	0.3	.....	[3]	.....	0.3	76,780	4.9	5.1	5.1	0.0	−0.2	23,056	1.3	0.2	.....	.....	1.1
Reading, Pa.	.....	.....	.....	[2]	.....	.....	139,297	6.2	6.4	6.4	0.0	−0.2	.....	.....	.....	.....	.....	.....
Trenton, N. J.	1,223	0.1	.....	.....	.....	0.1	222,704	11.4	11.0	8.4	2.6	0.4	.....	.....	.....	.....	.....	.....
Bridgeport, Conn.	15,979	0.5	1.6	.....	1.6	−1.1	36,146	1.8	2.0	1.8	0.2	−0.2	.....	.....	.....	.....	.....	.....
Wilmington, Del.	.....	.....	.....	.....	.....	.....	9,624	0.7	0.7	0.3	0.4	0.0	9,164	0.5	0.5	.....	.....	0.0
Camden, N. J.	.....	.....	.....	.....	.....	.....	382,649	26.1	20.2	19.7	0.5	5.9	.....	.....	.....	.....	.....	.....
Des Moines, Ia.	20,768	1.2	0.4	0.4	0.0	0.8	227,016	13.8	10.6	3.3	7.3	3.2	.....	.....	.....	.....	.....	.....
Kansas City, Kan.	32,065	1.4	1.5	3.5	−2.0	−0.1	357,649	15.8	14.9	13.8	1.1	0.9	.....	.....	.....	.....	.....	.....
Lynn, Mass.	.....	.....	.....	.....	.....	.....	.....	.....	.....	[3]	.....	.....	62,236	2.6	1.1	.....	.....	1.5
New Bedford, Mass.	.....	.....	.....	.....	.....	.....	19,622	0.9	1.0	1.0	0.0	−0.1	41,300	2.7	1.9	.....	.....	0.8
Springfield, Mass.	28,683	1.0	0.6	0.3	0.3	0.4	7,877	0.4	0.4	0.4	0.0	0.0	39,168	2.0	1.4	.....	.....	0.6
Troy, N. Y.	.....	.....	.....	0.1	−0.1	.....	108,950	6.2	4.9	4.9	0.0	1.3	.....	.....	.....	.....	.....	.....
Oakland, Cal.	20,944	0.7	0.7	0.7	0.0	0.0	405,301	13.8	.....	.....	.....	13.8	.....	.....	10.1	.....	.....	−10.1
Lawrence, Mass.	.....	.....	.....	.....	.....	.....	6,707	0.3	0.3	0.3	0.0	0.0	.....	.....	.....	.....	.....	.....
Somerville, Mass.	.....	.....	.....	.....	.....	.....	10,410	0.7	0.7	0.7	0.0	0.0	51,491	2.7	0.9	.....	.....	1.8
Savannah, Ga.	.....	.....	.....	.....	.....	.....	176,494	6.8	5.7	5.7	0.0	1.1	.....	.....	.....	.....	.....	.....
Duluth, Minn.	347,990	11.7	20.9	20.1	0.8	−9.2	29,563	1.5	0.7	0.7	0.0	0.8	202,658	6.3	.....	.....	.....	6.3
Norfolk, Va.	.....	.....	.....	.....	.....	.....	454,028	22.9	20.5	18.4	2.1	2.4	17,952	0.9	.....	.....	.....	0.9
Hoboken, N. J.	.....	.....	.....	.....	.....	.....	96,070	4.8	4.8	4.8	0.0	0.0	.....	.....	.....	.....	.....	.....
Peoria, Ill.	.....	.....	.....	.....	.....	.....	251,490	12.7	12.7	12.6	0.1	0.0	.....	.....	.....	.....	.....	.....
Yonkers, N. Y.	.....	.....	.....	.....	.....	.....	142,150	6.9	6.7	7.3	−0.6	0.2	7,125	0.5	0.5	.....	.....	0.0
Utica, N. Y.	1,849	0.1	0.1	0.1	0.0	0.0	887,031	54.3	47.4	41.1	6.3	6.9	.....	.....	.....	.....	.....	.....
Manchester, N. H.	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.4	−2.4	.....	.....	.....	.....	.....	.....	.....
Schenectady, N. Y.	.....	.....	.....	.....	.....	.....	504,486	28.7	.....	17.5	.....	[4]11.2	.....	.....	.....	.....	.....	.....
Evansville, Ind.	.....	.....	.....	.....	.....	.....	172,112	8.7	7.0	3.5	3.5	1.7	.....	.....	.....	.....	.....	.....
San Antonio, Texas.	58,953	3.0	3.0	2.3	0.7	0.0	146,226	6.5	6.5	6.5	0.0	0.0	.....	.....	.....	.....	.....	.....
Elizabeth, N. J.	96,940	4.6	5.1	5.2	−0.1	−0.5	76,031	3.6	2.5	1.9	0.6	1.1	10,982	0.5	.....	.....	.....	0.5
Waterbury, Conn.	.....	.....	.....	.....	.....	.....	3,748	0.2	0.3	0.3	0.0	−0.1	27,676	1.9	.....	.....	.....	1.9
Salt Lake City, Utah.	.....	.....	.....	.....	.....	.....	316,029	9.0	4.8	[5]4.7	0.1	4.2	.....	.....	.....	.....	.....	.....
Wilkes-Barre, Pa.	.....	.....	.....	.....	.....	.....	140,798	8.0	8.4	8.4	0.0	−0.4	.....	.....	.....	.....	.....	.....
Erie, Pa.	.....	.....	.....	.....	.....	.....	400,307	17.4	14.9	14.2	0.7	2.5	.....	.....	.....	.....	.....	.....
Houston, Texas.	50,582	4.7	6.0	2.7	3.3	−1.3	160,462	8.8	9.0	6.3	2.7	−0.2	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	1,866	0.1	1.2	1.6	−0.4	−1.1	474,912	22.5	12.1	2.2	9.9	10.4	86,313	2.9	.....	.....	.....	2.9

City	WOOD BLOCK						ASPHALT AND ASPHALT BLOCK						BITUMINOUS MACADAM					
	Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between		Area, Sq. Yds., 1907	Length, Miles of Street			Gain Between	
		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907		1907	1905	1903	1903 & 1905	1905 & 1907
Harrisburg, Pa	3,006	0.2	0.2	0.2	0.0	0.0	443,001	28.1	18.1	6.5	11.6	10.0	2,010	0.1	0.1			0.0
Charleston, S. C							14,319	0.7	0.7	0.7	0.0	0.0						
Portland, Maine													45,872	2.3	1.1			1.2
Youngstown, Ohio							306,661	16.8	13.3	12.7	0.6	3.5						
Dallas, Texas	129,043	5.6	8.0	8.0	0.0	−2.4	115,239	3.7	4.2	3.3	0.9	−0.5	103,432	4.4				4.4
Terre Haute, Ind	13,552	0.6	0.6	0.6	0.0	0.0	85,418	3.6	3.6	3.6	0.0	0.0						
Fort Wayne, Ind	3,130	0.4	0.2	4.9	−4.7	0.2	513,340	27.1	20.9	14.1	6.8	6.2						
Akron, Ohio							56,916	3.2	3.2	2.4	0.8	0.0						
Holyoke, Mass	[1]14,080	0.8	0.5		0.5	0.3	[1]20,064	1.1	1.4	0.8	0.6	−0.3	[1]11,792	0.7	0.6			0.1
Brockton, Mass													32,217	2.0	2.0			0.0
Covington, Ky							[1]88,000	[4]4.0	3.3	3.3	0.0	0.7						
Saginaw, Mich	202,607	14.1	15.5	15.0	0.5	−1.4	303,904	20.2	13.2	9.1	4.1	7.0	17,218	1.1	0.9			0.2
Lincoln, Neb	35,905	1.4	2.9	3.3	−0.4	−1.5	193,487	11.8	6.5	3.3	3.2	5.3						
Altoona, Pa							101,587	6.3	6.2	6.5	−0.3	0.1						
Spokane, Wash							217,173	7.5	3.6	8.8	−5.2	3.9						
Lancaster, Pa							24,710	1.1	1.3	1.0	0.3	−0.2						
Birmingham, Ala							5,353	0.3				0.3	258,745	10.2	3.2			7.0
Bayonne, N. J	11,528	0.1	1.0		1.0	−0.9	96,062	3.2	3.0	1.6	1.4	0.2						
South Bend, Ind	2,760	0.2	0.1	0.3	−0.2	0.1	116,015	4.8	4.1	3.9	0.2	0.7	723	0.1	0.1			0.0
Butte, Mont																		
Pawtucket, R. I										0.1	−0.1		60,067	3.4	1.8			1.6
McKeesport, Pa																		
Binghamton, N. Y							55,456	2.4	5.0	5.0	0.0	−2.6						
Johnstown, Pa																		
Dubuque, Iowa	440	[3]		0.1	−0.1													
Sioux City, Iowa	111,612	4.2	4.8	4.8	0.0	−0.6	223,136	8.4	7.7	6.8	0.9	0.7						
Augusta, Ga										0.9	−0.9							
Mobile, Ala	24,081	1.6		2.0	−2.0	1.6	85,767	4.5	4.5	3.3	1.2	0.0	46,014	2.6				2.6
Topeka, Kan	34,445	1.4	1.5	1.5	0.0	−0.1	186,814	6.7	7.1	7.1	0.0	−0.4						
Springfield, Ohio	297	[3]		[3]			18,623	0.8	0.8	0.5	0.3	0.0						
Allentown, Pa							186,624	9.2	6.1	2.7	3.4	3.1	29,733	1.3	1.2			0.1
East St. Louis, Ill										0.2	−0.2							
Wheeling, W. Va																		
Montgomery, Ala							10,248	0.5				0.5						
Passaic, N. J							33,652	1.6	1.7	1.7	0.0	−0.1						
Davenport, Iowa	1,265	0.1				0.1	160,018	7.9	2.1		2.1	5.8	[3]907	[3]				
Atlantic City, N. J	3,767	0.4				0.4	25,722	1.4				1.4	108,520	3.8				3.8
Little Rock, Ark							78,883	4.3	1.3	0.7	0.6	3.0	7,873	0.4				0.4
Bay City, Mich	229,551	14.8	[1]11.8	28.7	−16.9	3.0	99,915	7.1		0.6		[4]6.5	6,571	0.8	[1]0.5			0.3
York, Pa							18,000	1.0	1.6	1.0	0.6	−0.6						
Malden, Mass																		
Springfield, Ill	4,343	0.2	2.8	1.4	1.4	−2.6	115,690	5.0	1.4		1.4	3.6						
Quincy, Ill																		
Canton, Ohio																		
Superior, Wis	739,663	30.0	29.5	32.8	−3.3	0.5	15,583	0.5	0.5		0.5	0.0	43,841	2.0	2.0			0.0
Chester, Pa							158,400	9.0	9.0	7.3	1.7	0.0						
Chelsea, Mass																		
South Omaha, Neb										1.4	−1.4							
New Castle, Pa							158,576	9.0	8.1	7.5	0.6	0.9						
Salem, Mass										2.5	−2.5		17,500	0.6	0.5			0.1
Newton, Mass													207,104	11.5				11.5
Haverhill, Mass																		
Jacksonville, Fla																		
Joplin, Mo							3,592	0.2	0.1	0.1	0.0	0.1						
Wichita, Kan							174,285	5.8		4.6	−4.6	5.8	19,221	0.5				0.5
Rockford, Ill							38,206	2.0	2.0	2.0	0.0	0.0						
Knoxville, Tenn							46,787	2.0				2.0	30,637	1.3				1.3
Elmira, N. Y							104,813	4.6	4.0	2.8	1.2	0.6	11,789	0.5	0.5			0.0
Galveston, Texas	59,722	2.4	5.0	3.5	1.5	−2.6				0.1	−0.1							
New Britain, Conn									0.1	0.1	0.0	−0.1	3,580	0.2				0.2
Chattanooga, Tenn							81,335	3.6	3.6	3.6	0.0	0.0						
Kalamazoo, Mich				0.3	−0.3		61,265	3.9	3.0	0.5	2.5	0.9	43,530	1.5	1.6			−0.1
Woonsocket, R. I	2,090	0.1				0.1			0.1		0.1	−0.1	12,273	0.7	0.7			0.0
Fitchburg, Mass																		
Racine, Wis	90,396	4.1	4.1	4.7	−0.6	0.0	13,981	0.7	0.7		0.7	0.0						
Auburn, N. Y							105,551	4.0	2.2	2.0	0.2	1.8	29,383	1.4	0.5			0.9
Macon, Ga							14,666	0.5	0.3		0.3	0.2						
Joliet, Ill				0.3	−0.3		171,868	7.8	6.8	5.8	1.0	1.0						
Oklahoma City, Okla							755,860	37.2				37.2						
Oshkosh, Wis	[1]127,862	[1]5.3	8.0	8.8	−0.8	−2.7	[1]58,218	[1]3.4	2.2	2.0	0.2	1.2	[1]55,088	[1]3.1				3.1
West Hoboken, N. J							49,426	2.1		1.5		[4]0.6						
Sacramento, Cal							132,472	5.0	0.3	0.3	0.0	4.7	53,504	1.9	3.3			−1.4
Pueblo, Col							102,631	3.5				3.5	38,866	1.3	0.4			0.9
Everett, Mass													5,625	0.6				0.6
Taunton, Mass													17,764	0.9	0.8			0.1
Newport, Ky							6,490	0.3		0.2		[4]0.1	1,766	0.1				0.1
La Crosse, Wis	11,146	0.7	0.1		0.1	0.6												
Fort Worth, Texas	[1]5,866	[1]0.2				0.2	[1]52,800	[1]2.0		0.8		[4]1.2	[1]26,000	[1]1.0				1.0
Totals	[1]16,767,918	954.7	1,067.6	1,202.1	−112.9	−134.5	75,437,652	3,970.4	3,280.4	2,812.9	690.0	467.5	3,938,276	190.8	83.7			107.1
Percentage gain					−9.4	−12.6					24.5	14.3						128.0

[1] Estimated. [2] Not reported. [3] Less than one-tenth mile. [4] Between 1903 and 1907 [5] Includes stone block.

City	MACADAM						GRAVEL					
	Area, Sq. Yds.,	Length, Miles of Street			Gain Between		Area, Sq. Yds.	Length, Miles of Street			Gain Between	
	1907	1907	1905	1903	1903 & 1905	1905 & 1907	1907	1907	1905	1903	1903 & 1905	1905 & 1907
New York, N. Y.	8,944,740	708.3	687.6	779.3	−91.7	20.7	184,377	17.4	17.5	18.6	−1.1	−0.1
Chicago, Ill.	9,774,303	574.8	491.0	465.5	25.5	83.8						
Philadelphia, Pa.	2,977,779	283.7	273.3	262.7	10.6	10.4						
St. Louis, Mo.	5,374,132	274.1	292.0	233.7	58.3	−17.9						
Boston, Mass.	6,348,389	346.0	337.1	317.8	19.3	8.9	480,917	31.3	33.6	57.5	−23.9	−2.3
Baltimore, Md.	728,556	54.4	49.9	47.3	2.6	4.5						
Pittsburg, Pa.	154,757	9.8	9.7	10.3	−0.6	0.1						
Cleveland, Ohio.	24,324	.3				1.3						
Buffalo, N. Y.	231,892	1	12.3	12.3	0.0	−0.2			[8]	8.9		
San Francisco, Cal.	1,052,554	1	41.0		41.0	3.4						
Detroit, Mich.	618,902	3	17.2	12.4	4.8	14.0			21.8	38.1	−16.3	−21.8
Cincinnati, Ohio.	4,032,525	230.4	224.6	225.0	−0.4	5.8	96,250	5.5	5.5	5.5	0.0	0.0
Milwaukee, Wis.	5,499,880	265.2	256.8	0.5	256.3	8.4				244.9	−244.9	
New Orleans, La.							639,232	45.4	45.4	45.4	0.0	0.0
Washington, D. C.	1,310,733	83.1	79.5	78.0	1.5	3.6	705,872	39.3	80.6		80.6	−41.3
Newark, N. J.	563,327	26.7	23.7	19.1	4.6	3.0						
Minneapolis, Minn.	213,297	13.5	[1]12.2	10.6	1.6	1.3						
Jersey City, N. J.	309,102	17.7	17.3	17.3	0.0	0.4						
Louisville, Ky.	[1]1,917,804	86.7	94.1	91.4	2.7	−7.4	[1]19,908	0.9	0.8	1.1	−0.3	0.1
Indianapolis, Ind.	226,398	10.4	8.0	6.1	1.9	2.4	910,800	105.0	[1]124.0	116.7	7.3	−19.0
St. Paul, Minn.	736,429	39.8	19.1	12.9	6.2	20.7	200,278	8.6	5.5		5.5	3.1
Providence, R. I.	3,168,000	180.0	194.7	170.1	24.6	−14.7	[1]305,536	[1]17.4		20.2		[4]−2.8
Rochester, N. Y.	367,976	26.9	27.2	26.9	0.3	−0.3	181,015	12.9	13.9	15.1	−1.2	−1.0
Kansas City, Mo.	203,255	31.6	30.1	36.5	−6.4	1.5						
Toledo, Ohio.	255,552	14.5	13.6	13.5	0.1	0.9						
Denver, Colo.	190,958	9.1	12.3	5.7	6.6	−3.2						
Columbus, Ohio.	145,150	8.3	8.3	6.4	1.9	0.0						
Los Angeles, Cal.	115,032	4.9	4.4	4.1	0.3	0.5	6,459,916	275.3	275.3	268.9	6.4	0.0
Worcester, Mass.	812,746	46.0	42.5	42.3	0.2	3.5	453,848	73.3	70.0	[2]	70.0	3.3
Seattle, Wash.	24,883	1.4	1.4	2.7	−1.3	0.0						
Memphis, Tenn.	75,093	2.7	2.5	[2]	2.5	0.2	1,964,444	84.0	60.0	[2]	60.0	24.0
Omaha, Neb.	62,176	4.4	4.0	3.1	0.9	0.4						
New Haven, Conn.	1,149,868	65.2	64.0	[1]64.0	0.0	1.2						
Scranton, Pa.												
Syracuse, N. Y.												
St. Joseph, Mo.	488,498	27.8	30.6	26.7	3.9	−2.8						
Paterson, N. J.	1,330,545	63.0	63.0	63.0	0.0	0.0						
Portland, Ore.	1,531,010	72.5	63.9	48.1	15.8	8.6	1,949,291	92.3	74.5	59.8	14.7	17.8
Atlanta, Ga.	613,976	36.9	3.0	2.5	0.5	33.9			19.3		19.3	−19.3
Richmond, Va.	[6]2,512,392	[6]79.4	76.2	[2]	76.2	3.2				[2]		
Fall River, Mass.	582,757	44.7	39.8	34.0	5.8	4.9	845,340	55.4	55.4	55.4	0.0	0.0
Nashville, Tenn.	3,327,496	203.0	178.7	181.6	−2.9	24.3						
Dayton, Ohio.	7,370	0.4	0.2	0.8	−0.6	0.2	5,026,800	285.5	285.5	152.0	133.5	0.0
Grand Rapids, Mich.	122,140	6.3	6.3	6.3	0.0	0.0	2,821,390	145.7	143.5	139.9	3.6	2.2
Cambridge, Mass.	1,237,960	85.0	86.9	77.5	9.4	−1.9				10.0	−10.0	
Albany, N. Y.	110,616	6.3	6.0	3.4	2.6	0.3						
Hartford, Conn.	1,655,000	94.0	94.4	88.1	6.3	−0.4						
Lowell, Mass.	565,840	32.1	32.0	29.6	2.4	0.1	1,412,400	80.2	78.0	[1]76.0	2.0	2.2
Reading, Pa.	1,517,827	51.8	51.8	51.8	0.0	0.0						
Trenton, N. J.	148,283	10.6	13.4	5.5	7.9	−2.8						
Bridgeport, Conn.	1,498,464	85.2	86.0	80.0	6.0	−0.8						
Wilmington, Del.	359,216	20.4	19.2	18.7	0.5	1.2			1.4	1.4	0.0	−1.4
Camden, N. J.	58,667	4.0	2.7	2.8	−0.1	1.3						
Des Moines, Iowa.	3,121	0.2	0.6	1.0	−0.4	−0.4	1,643	0.1	0.2	0.2	0.0	−0.1
Kansas City, Kan.	72,623	3.5	3.5	3.7	−0.2	0.0						
Lynn, Mass.	257,596	10.6	10.6	10.0	0.6	0.0						
New Bedford, Mass.	852,624	68.6	65.4	63.2	2.2	3.2				57.0	−57.0	
Springfield, Mass.	1,063,040	60.4	53.5	49.9	3.6	6.9	1,425,952	81.0	73.1		73.1	7.9
Troy, N. Y.	53,543	3.0	3.0	3.0	0.0	0.0	53,000	3.0		[12]		3.0
Oakland, Cal.	5,054,016	239.3	203.2	150.5	52.7	36.1			12.0		12.0	−12.0
Lawrence, Mass.	449,508	25.5	24.1	22.1	2.0	1.4			66.4		66.4	−66.4
Somerville, Mass.	1,535,900	65.4	65.4	63.3	2.1	0.0	224,752	12.8	23.6	0.3	23.3	−10.8
Savannah, Ga.							25,054	3.5	3.2	3.6	−0.4	0.3
Duluth, Minn.	524,381	29.6	31.1	25.4	5.7	−1.5	1,020,000	56.9	56.4	55.8	0.6	0.5
Norfolk, Va.	24,542	1.4	0.1		0.1	1.3						
Hoboken, N. J.	12,264	0.7		0.3		[4]0.4						
Peoria, Ill.	597,308	21.0	1.0	1.0	0.0	20.0						
Yonkers, N. Y.	1,204,750	84.2	78.5	83.3	−4.8	5.7						
Utica, N. Y.	9,638	0.9	0.6		0.6	0.3						
Manchester, N. H.	396,464	20.8	20.0	15.9	4.1	0.8						
Schenectady, N. Y.	45,378	3.5	3.5	3.1	0.4	0.0						
Evansville, Ind.	86,456	3.8	4.0	4.0	0.0	−0.2	71,800	4.0	4.0	3.0	1.0	0.0
San Antonio, Texas	715,733	43.5	1.0		1.0	42.5	2,251,000	104.0	104.0		104.0	0.0
Elizabeth, N. J.	403,599	19.1	18.7	18.5	0.2	0.4						
Waterbury, Conn.	117,513	6.7	5.2	4.6	0.6	1.5	739,203	60.0	60.0		60.0	0.0
Salt Lake City, Utah.	68,677	3.1				3.1						
Wilkes-Barre, Pa.												
Erie, Pa.												
Houston, Texas.	28,148	4.0	4.0	1.4	2.6	0.0	595,766	32.5	31.0	6.7	24.3	1.5
Tacoma, Wash.	14,053	0.3				0.3	12,880	0.4	0.8	4.8	−4.0	−0.4
Harrisburg, Pa.	278,623	15.0	15.7	31.8	−16.1	−0.7						

City	MACADAM						GRAVEL					
	Area, Sq. Yds.,	Length, Miles of Street			Gain Between		Area, Sq. Yds.	Length, Miles of Street			Gain Between	
	1907	1907	1905	1903	1903 & 1905	1905 & 1907	1907	1907	1905	1903	1903 & 1905	1905 & 1907
Charleston, S. C.	54,481	4.2	4.1	4.1	0.0	0.1	75,713	6.1	6.1	6.9	−0.8	0.0
Portland, Maine	195,277	11.9	9.5	9.4	0.1	2.4	[1]1,674,640	[1]86.5				86.5
Youngstown, Ohio	12,000	0.9	1.5	2.9	−1.4	−0.6						
Dallas, Texas	643,100	31.1	20.3	20.0	0.3	10.8						
Terre Haute, Ind	166,136	7.1	7.1	12.2	−5.1	0.0	1,451,195	63.5	62.7	66.7	−4.0	0.8
Fort Wayne, Ind												
Akron, Ohio	107,087	6.8	6.8	3.0	3.8	0.0						
Holyoke, Mass	[1]189,200	10.8	11.7	4.3	7.4	−0.9	[1]620,400	35.2	23.6	32.2	−8.6	11.6
Brockton, Mass	239,375	18.3	15.6	12.9	2.7	2.7	1,061,816	64.5	64.5	66.6	−2.1	0.0
Covington, Ky	[1]627,370	[1]39.0	27.5	27.1	0.4	11.5			7.2		7.2	−7.2
Saginaw, Mich	163,541	11.2	7.3	12.3	−5.0	3.9						
Lincoln, Neb												
Altoona, Pa	10,000	0.6	0.5	1.3	−0.8	0.1				0.5	−0.5	
Spokane, Wash												
Lancaster, Pa	714,884	45.1	41.0	30.5	10.5	4.1						
Birmingham, Ala	1,436,797	64.0	58.7	49.1	9.6	5.3						
Bayonne, N. J	293,996	10.7	10.4	10.0	0.4	0.3						
South Bend, Ind	14,836	0.8	0.8	0.2	0.6	0.0	40,993	1.4				1.4
Butte, Mont												
Pawtucket, R. I	182,700	17.3	16.1	16.4	−0.3	1.2	674,800	63.9	62.7	62.3	0.4	1.2
McKeesport, Pa												
Binghamton, N. Y	73,920	4.2	4.2	1.0	3.2	0.0			[1]12.0		12.0	−12.0
Johnstown, Pa				0.7	−0.7							
Dubuque, Iowa	1,746,212	91.0	88.5	88.1	0.4	2.5						
Sioux City, Iowa	46,550	1.8	0.3	0.3	0.0	1.5			1.4	1.4	0.0	−1.4
Augusta, Ga	521,631	24.6	22.3	19.8	2.5	2.3	401,778	19.9	15.4	13.7	1.7	4.5
Mobile, Ala	27,700	1.0	1.0	1.0	0.0	0.0	40,500	1.5	1.5	1.5	0.0	0.0
Topeka, Kan	11,000	1.4	1.0	0.6	0.4	0.4						
Springfield, Ohio	336,129	14.3	12.2	15.1	−2.9	2.1	1,126,900	48.1	47.0	47.0	0.0	1.1
Allentown, Pa	135,880	8.8	9.5	9.5	0.0	−0.7						
East St. Louis, Ill	[1]76,032	3.6	3.6	3.6	0.0	0.0						
Wheeling, W. Va	26,048	1.5	4.0	6.7	−2.7	−2.5	54,667	2.5	5.0	3.0	2.0	−2.5
Montgomery, Ala							103,787	4.7	5.8	5.8	0.0	−1.1
Passaic, N. J	498,960	31.5	30.0	26.6	3.4	1.5						
Davenport, Iowa	7,931	0.7	15.5	15.5	0.0	−14.8						
Atlantic City, N. J	542,211	23.9	23.8	16.3	7.5	0.1	415,360	23.6	28.3	37.0	−8.7	−4.7
Little Rock, Ark	255,680	13.7	14.0	11.4	2.6	−0.3			51.0	47.6	3.4	−51.0
Bay City, Mich	83,600	4.8	[1]4.8	2.3	2.5	0.0						
York, Pa	450,000	25.0	31.0	30.8	0.2	−6.0						
Malden, Mass	176,315	6.7	5.8	5.8	0.0	0.9	1,100,587	53.6	53.6	52.8	0.8	0.0
Springfield, Ill	38,870	1.5	2.8	2.8	0.0	−1.3						
Quincy, Ill	259,840	12.7	11.2	11.2	0.0	1.5						
Canton, Ohio							290,000	14.3	12.0		12.0	2.3
Superior, Wis	262,199	15.9	8.0		8.0	7.9						
Chester, Pa	52,800	3.3	3.0	3.0	0.0	0.3						
Chelsea, Mass	374,880	21.3	22.0	16.0	6.0	−0.7	176,000	10.0	9.0	16.0	−7.0	1.0
South Omaha, Neb				0.2	−0.2							
New Castle, Pa	17,600	1.0	1.5	0.6	0.9	−0.5						
Salem, Mass	424,189	23.4	38.7	40.5	−1.8	15.3	306,250	24.0	40.9	38.4	2.5	−16.9
Newton, Mass	1,395,632	77.5	84.0	77.7	6.3	−6.5	900,400	50.0	55.0	61.3	−6.3	−5.0
Haverhill, Mass	193,428	14.0	14.0	12.4	1.6	0.0						
Jacksonville, Fla	60,202	4.3	0.1	0.6	−0.5	4.2			2.5		2.5	−2.5
Joplin, Mo	750,420	47.4	42.0	35.0	7.0	5.4	88,000	5.0				5.0
Wichita, Kan			2.0		2.0	−2.0						
Rockford, Ill	1,132,252	53.2		40.0		[4]13.2						
Knoxville, Tenn	1,101,129	55.2	59.5	60.0	−0.5	−4.3						
Elmira, N. Y	84,326	5.7	5.9	4.8	1.1	−0.2	623,314	42.3	42.6	45.0	−2.4	−0.3
Galveston, Texas			0.1	1.4	−1.3	−0.1				5.6	−5.6	
New Britain, Conn	352,000	20.0	31.8	[1]30.0	1.8	−11.8						
Chattanooga, Tenn	34,406	3.3	2.8	3.2	−0.4	0.5	193,006	13.7	12.1	10.5	1.6	1.6
Kalamazoo, Mich	11,542	0.8		0.3	−0.3	0.8						
Woonsocket, R. I	264,000	15.0	16.0	16.0	0.0	−1.0	523,380	36.1	35.0		35.0	1.1
Fitchburg, Mass	[1]185,128	13.0	12.1	9.6	2.5	0.9						
Racine, Wis	62,295	3.0	2.2	2.4	−0.2	0.8						
Auburn, N. Y	[1]492,800	[1]30.0	20.0	43.3	−23.3	10.0	[1]58,666	[1]5.0	11.4		11.4	−6.4
Macon, Ga												
Joliet, Ill	286,518	13.8	13.8	20.4	−6.6	0.0	126,706	6.2	6.3		6.3	−0.1
Oklahoma City, Okla	8,500	0.5				0.5						
Oshkosh, Wis	[1]282,950	[1]13.8	12.5	5.5	7.0	1.3	[1]445,574	[1]21.7	22.0	28.1	−6.1	−0.3
West Hoboken, N. J	61,160	2.9		3.2		[4]−0.3						
Sacramento, Cal	385,308	14.8	15.9	12.0	3.9	−1.1	675,840	24.0	24.2	27.5	−3.3	−0.2
Pueblo, Col	17,330	0.9	1.0		1.0	−0.1				2.6	−2.6	
Everett, Mass	401,700	28.5		26.4		[4]2.1	223,870	15.9		6.3	−6.3	15.9
Taunton, Mass	345,241	23.1	23.0	20.9	2.1	0.1						
Newport, Ky	415,200	20.5		20.4		[4]0.1						
La Crosse, Wis	609,859	29.5	28.4	24.4	4.0	1.1	162,624	9.2	9.2		9.2	0.0
Fort Worth, Texas				80.0	[4]	−80.0	[1]880,000	[1]50.0				50.0
Totals	109,578,350	6,274.2	5,802.9	5,348.9	454.0	471.3	45,595,430	2,536.0	2,576.2[12]	2,153.1	423.1	−40.2
Percentage gain					8.5	8.1						

[1] Estimated. [2] Not reported. [3] Less than one-tenth mile. [4] Between 1903 and 1907. [6] Includes gravel streets. [7] Includes Macadam. [8] No city record. [12] Included in unpaved streets.

TOTAL PAVEMENTS, JANUARY 1, 1910

City	Cobble Stone		Stone Block		Brick or Clay Block		Creosoted Wood Block		Sheet Asphalt		Asphalt Block		Bituminous Macadam or Bit. Concrete		Macadam		Surface Treatment		Remarks
	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	
New England																			
Bangor, Maine																			Quantities not known.
Lewiston, Maine			58,814										9,000		70,400				3.41 mi. Hassam.
Cambridge, Mass.				9.81		3.57		0.18		0.16				2.81		84.58			0.84 mi. Hassam.
Everett, Mass.				1.09	2,850									0.40		35.54		2.35	13.45 mi. gravel.
Fitchburg, Mass.		0.40		6.05										2.00		12.82		2.0	
Haverhill, Mass.			92,395				1,000								264,733		60,000		7,863 sq. yds. Hassam.
Holyoke, Mass.				2.74		1.96		0.80		0.60		0.54		0.67		15.0		11.0	24.01 mi. of gravel.
Lowell, Mass.				16.05		0.17		0.25		1.93				1.31		35.56		1.11	78.06 mi. of gravel; 0.44 mi. Hassam
Lynn, Mass.			106,465		2,740				350				54,851		257,596				27,921 sq. yds. Hassam.
New Bedford, Mass.	144,521	11.77	99,056	6.93	9,276	0.34			10,891	0.35	6,511	0.45	45,234	2.91	940,443	74.05		60.0	
Newton, Mass.																91.0		63.0	112½ mi. of gravel and other kinds.
North Adams, Mass.				0.20	43,298	2.17										4.54			46.9 mi. of gravel.
Pittsfield, Mass.									27,783				18,900		18,500				3,647 sq. yds. concrete.
Somerville, Mass.				3.04		0.20				0.73				2.56		66.05		10+	1.8 mi. Hassam, 20.55 gravel or unimp.
Springfield, Mass.			36,716		86,140		46,738		7 877				39,934		1,205,564			12.0	157,471 mi. of gravel.
Newport, R. I.		0.1		2.2										1.6		57.3			
Pawtucket, R. I.			91,691		1,965								63,359			20.06			64.39 mi. of gravel.
Providence, R. I.		4.96		33.86		0.45				5.12				1.20		[1]200.66		4.0	
Woonsocket, R. I.	600		15,532		10,335		2,090						14,265						
Hartford, Conn.				1.0						8.75						100.0			
Meriden, Conn.	1,563		3,238		11,267						7,219	0.25			115,000				40 mi. of stone, gravel and cinders.
New Britain, Conn.														0.2		22.8			56.5 mi. of gravel.
Middle Atlantic																			
Albany, N. Y.		8.80		0.77		31.26				9.99						6.43			
Amsterdam, N. Y.			10,285		51,279		120		8,766			0.82				[2]15.0			
Binghamton, N. Y.					229,556				49,796							5.0			
Buffalo, N. Y.		77.43		15.16		22.35				237.29						14.97			
Elmira, N. Y.			29,634		102,910				104,813				11,789			5.24			41.83 mi. gravel; 62.16 mi. other kinds.
Jamestown, N. Y.			2,207		247,258		1,546						20,835						
Kingston, N. Y.		0.4		0.75		2.23										36.4			
Middletown, N. Y.						2.25													
New York, N. Y.		18.0		378.8		17.6		22.3		674.3				4.1		805.3	[2]1,303,000		
Niagara Falls, N. Y.				0.25		3.15		0.10		17.2		132.3		2.40		3.0			2.54 mi. Hassam.
Poughkeepsie, N. Y.	2,775		35		64,053		4,808.10		17,450		20,102	1.78	13,094		33,000				
Syracuse, N. Y.				1.81		22.96				39.51				0.21		0.65			3.6 mi. asphaltina.
Watertown, N. Y.				0.5		1.75				4.0				0.75		24.0			
Camden, N. J.		3.39		29.32		2.60				25.13						4.22			12.86 mi. rubble.
East Orange, N. J.												3.08				55.08			
Elizabeth, N. J.		0.11		16.48		1.12		4.59		4.15						19.10		0.52	
Hoboken, N. J.				16.37		0.17		0.32						0.17		0.32			
Jersey City, N. J.				80.06		0.66		1.89		26.08		4.85				17.97			
Passaic, N. J.			16,193		4,925				23,652					0.73		30.97			
Paterson, N. J.	14,580		108,292		137,207		19,244		125,335				17,295			65.0			
Allentown, Pa.					36,974				251,155				26,038		135,880				
Altoona, Pa.		0.12		0.94		21.18				4.26									
Carbondale, Pa.					47,777							1.72							
Chester, Pa.		1.19		4.19		2.73				9						3.25			
Easton, Pa.						2.36		0.24								35.9			18.4 mi. other kinds.
Erie, Pa.			50,957		340,872		878		584,616		12,985								
Harrisburg, Pa.						2.6	3,006			35.0			2,010						
Lancaster, Pa.			30,314		109,201						19,477	0.61			728,716				
New Castle, Pa.						14.03													
Norristown, Pa.				1.42		6.28	900					9.01		3.58		13.10			0.55 mi. concrete macadam.
Philadelphia, Pa.		27.0		398.72		165.91		1.54		448.36		0.19				295.03			12.77 mi. granolithic.
Pittsburg, Pa.		22.22		224.7		58.88		0.05		183.19		15.76				10.58			7.41 mi. other kinds.
Reading, Pa.		6.25		0.5		14.25				5.91		1.21				51.75			
Scranton, Pa.			38,904		123,687				403,809				25,818						
Shenandoah, Pa.																5.0			
Wilkes-Barre, Pa.				6.0		22.7				8.5						0.06			
Williamsport, Pa.	483				137,208				74,729.3										
South Atlantic																			
Washington, D. C.	156,300		465,376		23,415				2,944,547		595,142				1,310,277				1,400,000 sq. yds. gravel.
Newport News, Va.					39,300				50,000		42,500		40,000		46,300				
Charlotte, N. C.					13,094								40,422	1.0		45.73			
Charleston, S. C.		2.79		17.14		4.62				0.68	66					4.56		0.10	5.46 mi. gravel.
Ohio Valley																			
Akron, Ohio				1.5		48.0						3.0				3.0			
Canton, Ohio						3.68							83,760						
Cleveland, Ohio				95.7		261.5		1.1		24.6				1.1		1.5			

City	Cobble Stone		Stone Block		Brick or Clay Block		Creosoted Wood Block		Sheet Asphalt		Asphalt Block		Bituminous Macadam or Bit. Concrete		Macadam		Surface Treatment		Remarks
	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	
Ohio Valley—Cont.																			
Columbus, Ohio		4.30		8.75		138.71				25.85		0.10		0.67		11.09			
East Liverpool, Ohio						18.5													
Lima, Ohio						14.0				5.0		1.5				1.0			
Marion, Ohio						12.21				3.63		0.62				6.2			1¼ mi. brick alley paving.
Newark, Ohio						13.17				0.37									
Norwood, Ohio				1.5		0.5				0.5						40.0			
Sandusky, Ohio						6.62				4.84		1.88							
Anderson, Ind						15.85		0.34						0.70					19.50 mi. gravel; 0.13 mi. concrete.
Bedford, Ind						3.7										15.0			
Fort Wayne, Ind					335,497	17.54			530,178	28.28	2,125	0.08							2.86 mi. brick alleys.
Hammond, Ind						4.25										28.87			
Indianapolis, Ind						71.90		23.99		66.92				2.86		10.03			109.57 mi. gravel; includes resurfacing.
Marion, Ind		0.12				19.11				6.64						9.08			6.92 mi. gravel.
Richmond, Ind						1.52								0.08		41.11			32.16 mi. gravel; 0.2 mi. concrete.
South Bend, Ind					872,663		1,236		137,072				38,585						
Bloomington, Ill					479,034	26.22			45,282	6.39					4,849	0.3			
Cairo, Ill					51,347														
Chicago, Ill				84.81		122.79		10.75		479.84		1.90				571.96			3.23 mi. concrete; 400 mi. cedar block.
East St. Louis, Ill		4.0				37.0										2.0			
Elgin, Ill					120,984	5.0			25,245	1.2			968	0.09	30,426	1.65			
Evanston, Ill						9.84				2.45						43.0		13.37	0.36 mi. untreated wood block.
Freeport, Ill						21.0							7,400			14.0			
Moline, Ill					263,274						147,000				4,000				650 sq. yds. concrete.
Peoria, Ill	9,514		501		878,395				254,490						17,264				
Rockford, Ill						2.19				1.83						56.86			
Springfield, Ill						55.0				6.5				2.25		1.5			0.5 untreated wood block.
Covington, Ky					224,665				77,285							47.87			12.12 mi. other kinds.
Louisville, Ky		7.23		19.18		56.24				37.91		0.04		1.91		64.32			0.88 mi. gravel; 7.16 mi. other kinds
Paducah, Ky					73,416								42,094						51.3 mi. gravel.
Knoxville, Tenn						5.03				10.91				2.40					3.28 mi. Blome granitoid.
Upper Mississippi-Missouri																			
Detroit, Mich		1.04		3.93		101.49		5.26		71.17		2.69		0.28		16.62			0.12 mi. other kinds; 185.06 mi. untreated wood block.
Grand Rapids, Mich		0.25		0.25		21.49		0.48		5.58		1.44		0.50		6.98			147.68 mi. gravel; 1.3 mi. concrete; 1.05 mi. untreated wood block.
Jackson, Mich						4.5				1.3				0.33					
Lansing, Mich						9.41										0.50			.6342 sq. yds. gravel.
Saginaw, Mich	38,713				346,812				385,095				14,379		243,762				98,883 sq. yds. cedar block; 8,846 sq. yds. concrete macadam.
Minneapolis, Minn				40.97		23.27		40.26		10.38						16.35			8.68 mi. untreated wood block.
St. Paul, Minn				10.08		10.03				28.46						47.59			0.26 mi. untreated wood block; 16.2 mi. gravel.
Winona, Minn						3.5										6.7			
La Crosse, Wis					150,793		11,146								277,521				
Racine, Wis				0.007		16.19				2.94						2.74			1.05 mi. untreated wood block.
Cedar Rapids, Iowa						27.0						2.97				6.96		1.81	
Clinton, Iowa						15.0		0.25								2.0			
Dubuque, Iowa						7.31										70.13			
Ottumwa, Iowa					275,000				25,000									15.0	
Sioux City, Iowa						7.4		1.1		9.5									
Lincoln, Neb						21.2				12.8									1.1 mi. untreated wood block.
Kansas City, Mo			101,693		740,978		390		3,477,251				14,639						
St. Louis, Mo			1,334,318	70.02	2,742,450	142.02	61,901	3.26	1,245,332	59.46			807,249	38.69	5,871,004	276.83	382,084	25.05	
Lower Mississippi and Gulf																			
Helena, Ark						0.5										0.5			
New Orleans, La		32.60		28.90		10.11				69.50				3.90					39.12 mi. gravel; 90.27 mi. other kinds.
Rocky Mountains																			
Great Falls, Mont							31,200								1,800				50,000 sq. yds. gravel.
Salt Lake City, Utah				0.47						19.94						3.28			0.20 mi. cement.
Denver, Colo			81,436						560,640				14,000		201,000				102,428 sq. yds. concrete alley paving.
Pacific Coast																			
Spokane, Wash					15,653				363,173								38,527		
Portland, Ore				5.65		0.69		1.95		21.09				31.1		84.87			103.69 mi. gravel.
Los Angeles, Cal				2.11		3.23				47.79				6.6		7.9			179.7 mi. gravel; 310 mi. other kinds.
Boise, Idaho																			10,000 sq. yds. concrete.
*Troy, N. Y			415,757		278,454				122,107		2,508		14,790		53,543				
*Marietta, Ohio						14.4													
*Cheyenne, Wyo															1,280				
*Tacoma, Wash				6.98		6.73				43.18				2.23		0.36			0.6 mi. of untreated wood block; 0.26 granitoid; 3.78 plank.

[1]Includes gravel. [2]Approximate. *Too late for classification.

PAVEMENTS LAID IN 1909

City	Cobble Stone		Stone Block		Brick or Clay Block		Creosoted Wood Block		Sheet Asphalt		Asphalt Block		Bituminous Macadam and Bit. Concrete		Macadam		Surface Treatment		Remarks
	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	
New England																			
Bangor, Maine																			
Lewiston, Maine													9,000						Only repairs.
Cambridge, Mass.																			Not stated.
Everett, Mass.			4,115		2,850											2.20		1.95	
Fitchburg, Mass.				0.55										1.0					
Haverhill, Mass.			3,264										46,845				40,000		7,863 sq. yds. Hassam.
Holyoke, Mass.			1,445				1,420								17,731		67,117		
Lowell, Mass.				0.85												0.84			0.69 mi., gravel; 0.44 mi. Hassam.
Lynn, Mass.			671																10,073 sq. yds. Hassam.
New Bedford, Mass.			15,623	1.06											61,247	3.47		60.0	
Newton, Mass.																		54.0	Gravel, 0.5 mi.
North Adams, Mass.																			None.
Pittsfield, Mass.																			None.
Somerville, Mass.			75,380											1.68		0.82			
Springfield, Mass.			949				12,431						552		49,892			[2]12.0	
Newport, R. I.									20,000				10,478		32,731				Resurfacing, 31,554 sq. yds.
Pawtucket, R. I.			876										1,847			1.17			0.59 mi. gravel.
Providence, R. I.	556		7,992		451											2.72			Asphalt resurfaced, 7,727 sq. yds.
Woonsocket, R. I.					415														
Ansonia, Conn.															15,000				
Hartford, Conn.			4,600						22,875							[2]2.0			
Meriden, Conn.																			None.
New Britain, Conn.																2.8			
Middle Atlantic																			
Albany, N. Y.						3.10				0.16									
Amsterdam, N. Y.					8,139														
Binghamton, N. Y.					12,748														
Buffalo, N. Y.				0.46		0.86				5.95						1.57			
Elmira, N. Y.					20,078														
Jamestown, N. Y.					22,806								20,835						
Kingston, N. Y.					33,637												14,000		
Middletown, N. Y.																			None.
New York, N. Y.				10.8		0.5		1.3		44.0		19.9		1.3		0.9		[2]105.0	
Niagara, Falls, N. Y.						0.33				1.2				0.2					0.7 mi. Hassam.
Poughkeepsie, N. Y.					16,063		4,808						13,094		3,166				
Syracuse, N. Y.				0.10		0.96				2.91						0.65			
Troy, N. Y.			6,550		10.863								9,436						
Watertown, N. Y.						0.25								0.5		3.75			
Camden, N. J.																			Not stated.
East Orange, N. J.																0.80		3.75	
Elizabeth, N. J.			25,250		12,430					1.64									
Hoboken, N. J.				0.23		0.17		0.15		0.04				0.17					
Jersey City, N. J.			41,795		355		28,785		11,945										
Passaic, N. J.					911								5,481		50,910				
Paterson, N. J.			3,760				10,781		12,205						35,000				
Allentown, Pa.																			None.
Altoona, Pa.						5.04													
Carbondale, Pa.					5,150														
Chester, Pa.						0.50				0.25									
Easton, Pa.								0.24								1.75		[2]1.0	
Erie, Pa.					13,071				84,921										
Harrisburg, Pa.					8,652				59,474										
Lancaster, Pa.			4,183												13,574				
New Castle, Pa.						0.65													
Norristown, Pa.					5,000		900								34,400				
Philadelphia, Pa.				4.44		6.47		1.54		17.81						5.64			
Pittsburg, Pa.				4.30		4.09				3.46									
Reading, Pa.	500				1,100						5,000								
Scranton, Pa.			2,914		6,967				76,728										
Shenandoah, Pa.																			Not Stated.
Wilkes-Barre, Pa.						1.6				0.5						0.06			
Williamsport, Pa.																			11,094 sq. yds. asphalt resurfaced.
South Atlantic																			
Washington, D. C.	−9,056		−8,872						75,941		11,379								Cobble and stone block decreased.
Newport News, Va.					39,300						8,400				16,300				
Wheeling, W. Va.					49,348														
Charlotte, N. C.					5,483								10,665	1.0		1.0			1 m. bit. macadam; 10,665 sq. yds. bitulithic.
Charleston, S. C.						1.20													
Jacksonville, Fla.					80,000											0.40		0.10	
Ohio Valley																			
Akron, Ohio.			4,257		103,137						2,500								
Canton, Ohio.						2.07	43,740												

City	Cobble Stone		Stone Block		Brick or Clay		Creosoted Block		Sheet Asphalt		Asphalt Block		Bituminous Macadam and Bit. Concrete		Macadam		Surface Treatment		Remarks
	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	Sq. Yds.	Miles.	
Ohio Valley—Continued																			
Cleveland, Ohio				1.0		27.3				1.1				0.1					
Columbus, Ohio						15.86				2.96						0.81			
Dayton, Ohio			8,220																
East Liverpool, Ohio						1.5													
Lima, Ohio						5.0													2.25 mi. asphalt resurfaced.
Marion, Ohio																			None; 3,847 sq. yds. asphalt repairs.
Newark, Ohio						1.35				0.36									
Norwood, Ohio				1.5		0.5										3.5			
Sandusky, Ohio									36,000							3.0			
Anderson, Ind																			None.
Bedford, Ind						0.85													
Fort Wayne, Ind						0.37													
Hammond, Ind					13,776								18,611		10,907				
Indianapolis, Ind						5.59		0.36		4.09				1.03					1.22 mi. gravel.
Marion, Ind					11,838														
Richmond, Ind																2.70			1.47 mi. gravel.
South Bend, Ind					800				7,455						37,839				
Aurora, Ill					24,750				32,800										
Bloomington, Ill						1.11													
Cairo, Ill					22,382														
Chicago, Ill				15.5		16.0		3.5		64.0						17.0			
East St. Louis, Ill						1.25										0.5			
Elgin, Ill						1.17				0.01									
Evanston, Ill						0.98										0.57		10.77	
Freeport, Ill						1.9													
Moline, Ill									18,000										350 sq. yds. concrete.
Peoria, Ill					31,288														
Rockford, Ill						0.38				1.33						1.90			
Springfield, Ill					63,875				5,562				25,309						
Covington, Ky					10,659											1.6			
Louisville, Ky				0.58		0.32		0.24		1.57				1.74		0.15			
Knoxville, Tenn						0.6				5.8				0.1					29,642 sq. yds. Blome granitoid.
Upper Mississippi-Mo.																			
Bay City, Mich					38,562				45,495										
Detroit, Mich				0.17		10.57		0.95		13.33									11.58 mi. untreated wood block.
Grand Rapids, Mich						2.63		0.13						0.47					4.77 mi. gravel; 0.11 mi. concrete.
Jackson, Mich																			None.
Lansing, Mich					19,622														
Saginaw, Mich					25,938				33,900								54,900		
Minneapolis, Minn			47,722		8,078	0.51	143,338	9.05							38,361	23.21			
St. Paul, Minn				0.73		0.64				0.69						3.91		8.95	5.73 mi. gravel.
Winona, Minn																			
La Crosse, Wis					7,218										16,855				
Oshkosh, Wis					602		5,661								4,294				
Racine, Wis						1.66				0.89						0.33			
Cedar Rapids, Ia						5.21										1.81		1.81	
Clinton, Ia							9,000								8,000				
Dubuque, Ia					1,439										7,112				
Ottumwa, Ia					18,000														
Sioux City, Ia					49,690		13,400		17,230										9,388 sq. yds. asphalt resurfaced.
Lincoln, Neb						1.3													
South Omaha, Neb					21,510				5,925										
Kansas City, Mo			34,250		16,531		390		202,971						62,895				7,340 sq. yds. concrete in alleys.
St. Louis, Mo			190	0.02	161,135	8.41	6,516	0.42	107,616	5.72			93,035	4.80	24,354	2.01	382,084	25.05	
Lower Mississippi and Gulf																			
Helena, Ark																			None.
New Orleans, La																			Not reported.
Rocky Mountains																			
Butte, Mont			9,577		20,959														
Great Falls, Mont							13,500								1,800				2.75 mi. graded earth roadways.
Salt Lake City, Utah										4.18									0.13 mi. cement.
Denver, Colo									20,000										74,971 sq. yds. concrete alley paving.
Cheyenne, Wyo																			None.
Pacific Coast																			
Spokane, Wash									44,887								38,527		
Walla Walla, Wash									43,966						28,656				
Portland, Ore				0.31						6.42				10.35		11.56			9.18 mi. gravel.
Los Angeles, Cal				0.1		1.6				6.5						3.5			25 mi. gravel, oil, etc.
Stockton, Cal				0.06										0.12		1.0			0.6 mi. gravel.
Boise, Idaho																			10,000 sq. yds. concrete.
*Rochester, N. Y			18,000		53,000				100,000						23,000				
*Marietta, Ohio						0.4													
*Tacoma, Wash				1.59		2.16				18.42									Granitoid, 0.26 mi.; plank, 0.37 mi.

‡Estimated *Too late for classification

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest, Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

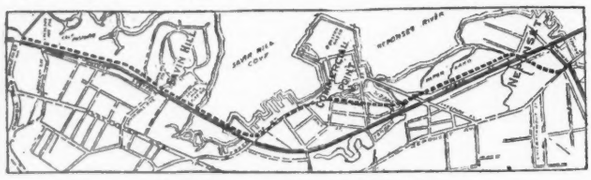
ROADS AND PAVEMENTS

Toll Roads Barred from Lehigh

Allentown, Pa.—Lehigh's Commissioners have paid the judgment of $35,000 entered against the county for the freeing of the Allentown and Coopersburg turnpike. The road was the particular bogey of automobilists running between Allentown and Philadelphia, the toll aggregating 30 cents at the four toll-gates. It was the last toll road in Lehigh County.

New Boulevard for Boston

Boston, Mass.—The construction of a boulevard from Upham's Corner, Dorchester, to Neponset, is being advocated by the Old Colony Avenue Association and the Harrison Square Improvement Association. The plan has the approval of the Metropolitan Park Commission, and a hearing will be held before the legislative committee on roads and bridges. A report of John R. Rablin, Engineer for the



PROPOSED NEPONSET BOULEVARD.

Metropolitan Improvement Commission, stated that the route from Columbia road to Neponset river, via Freeport street to Mill street, thence through Tenean creek to Tenean street to Neponset, was a distance of 14,500 feet, a little less than three miles, and estimated the cost at $998,500, of which $292,000 would be for the land taken, and the remainder for the cost of construction.

Concrete Pavement Criticized

Huntington, W. Va.—There has been a great deal of adverse comment relative to the concrete paving done by contractors Wright and Scanlon in Third avenue. The work was performed too late in the season to permit the concrete to set. The public insisted on driving over it too soon and this made matters worse. The work was begun about the first of November.

Pittsburg Inaugurates Huge Street Work

Pittsburg, Pa.—The owners of about sixty buildings in the downtown section have been notified to remove their structures from the line of streets which have recently been widened by ordinance in accordance with the general plan of improving the "Hump" district. They are given until April 30 to comply with the order, and an immediate movement among property owners to get in line for the improvements is looked for. Under the law when a street has been widened by ordinance, the owners of buildings which encroach on the street line are allowed the option of removing the buildings themselves or having them removed by the city at the owner's expense. As a general thing, owners prefer to attend to this themselves, and it is customary to give them a reasonable time. Probably the most important building affected is the Bakewell Law Building, at Grant and Diamond streets. A few feet of the front of it must be removed and necessary reconstruction work done. Buildings all along Diamond street from Smithfield street to the morgue will be affected, and the old Dispatch Building, in which is located the Anchor Bank, will be practically destroyed. One of the buildings affected contains the law offices of former Mayor George W. Guthrie. The fronts of a number of buildings in Fifth avenue opposite the Courthouse must come off. The streets affected by the widening improvements are Diamond street, Fifth avenue, Oliver avenue, Grant boulevard and Dante, Cherry and Strawberry alleys. Since the passage of the ordinances providing for the widenings all the property owners are in the position of trespassers on the public streets.

Revised Specifications for Indianapolis

Indianapolis, Ind.—No further street, sidewalk, alley and sewer improvements are to be ordered by the Board of Public Works, until a revision of all specifications for such improvements has been made by City Engineer Klausmann. Mr. Klausmann said that in many cases it had been several years since the specifications used by his Department and the Board had been revised. Some of them, he said, had not been revised since 1904. The asphalt pavement specifications, he said, seemed to be the only ones on record of recent origin. He said it was possible that in some instances more economical and equally satisfactory work could be obtained by slight changes. He also has in mind general specifications for a group of pavements that were not considered by the former Board as being modern city pavements. It is probable these various pavements will be grouped under a certain head and that this head will be considered as one of four kinds of permanent pavements that the Board is required to adopt specifications for in asking for bids. At the present time there are only four kinds recognized in adopting resolutions—brick, wooden block, asphalt and bitulithic. It is possible one or two additional kinds may be added to the Board's list, and in adopting resolutions and asking bids it will select four of the various recognized kinds. During the last administration there was much complaint because the board would not recognize bitumineral, bitumass and other similar pavements, the Board adhering closely to brick, asphalt, wooden block and bitulithic. It is the idea of the present Board to permit a majority of resident property owners to determine the kind of pavement they wish. Under the former Board, if property owners asked for other than the four "standard" kinds, the resolution was rescinded.

Defer Paving for Competition

Leavenworth, Kan.—Passage of resolutions for the paving of portions of thirteen streets, which were placed on the first reading at the meeting of the Board of City Commissioners, was indefinitely deferred by later action of the Board. The postponement of the final vote on the resolutions was due to a letter from the Ratliff-Gibson Paving Company of St. Joseph requesting the Board to hold up the resolutions for street work until they could send representatives to lay their proposition before property owners on the streets to be paved.

Good Paving Wanted at Low Price

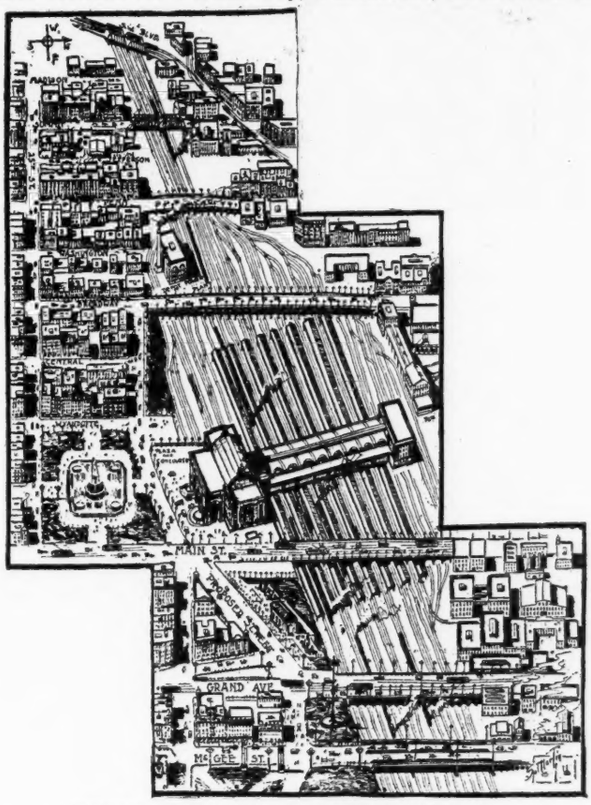
Portsmouth, Va.—The proposed appropriation for paving has been cut by the City Council, and E. B. Hawks, Chairman of the Street Committee, is considering the substitution of some cheaper material than vitrified brick for residence streets in order that the greater part of the paving program may be carried out. Macadam, while cheap enough, is too dusty and requires too much attention to prevent raveling, and the Committee is giving its attention to bituminous materials which may be both waterproof and dustless. Some of this material has been used on a cement base in the west with much success. The parking of a portion of the roadway is also under consideration for economy.

Spokane's Paving Record

Spokane, Wash.—According to City Engineer J. C. Ralston's figures, there were in the beginning of 1909 100 miles of graded streets, and during the year there were added 23.59 miles at a cost of $377,223; 190 miles of sidewalk, and during the year there were added 34.7 miles at a cost of $213,936; 12 miles of paving, and during the year 2.66 miles were added at a cost of $197,597, and there were 55.65 miles of sewer and during the year 15.6 miles were laid at a cost of $272,491. The estimated cost of the expenditures for concrete walks, graded streets, sewers, bridges, etc., was about $4,000,000, and it is estimated that the expenditures for 1910 will be about $5,515,552.

Plan to Widen Main Street

Kansas City, Mo.—A plan has been suggested for widening Main street and reducing the grade between Twenty-sixth and Spring streets. The plan suggested will require the condemnation of two hundred feet of ground on the east side of Main street from Twenty-sixth to Spring street. But it will provide a broad thoroughfare—280 feet—divided into sections for a traffic way, a boulevard, three street car



PROPOSED STREET IMPROVEMENT, KANSAS CITY

lines and sidewalk space through which the travel between the business part of the city and the growing residence territory to the south will be carried. It would call for a cut of about forty-eight feet near Thirtieth street, but it would wipe out the handicap of a long, steep grade of 5 per cent. This now constitutes an impediment to the city's growth along proper physical lines. A better communication between the two sections of the city representing its business and social life is needed. No other street affords the possibilities that Main street does for this purpose, because it always must be the main artery leading from the center of the city's business activity. Other north and south streets will be improved by bridging over the railroad tracks and other streets cut through near the new station.

Unit System for Street Work

Oakland, Cal.—In an effort to apply a unit system to street work under private contract and do away with objections which have been generally made and which have received the attention of the Grand Jury, the Street Committee of the City Council met with the City Engineer, District Attorney and Superintendent of Streets recently to hear the remarks of Richard Brenner, Secretary of the Street Committee of the Grand Jury. It has been alleged that under private contract there has been an excessive charge for street crossings, it being 73 per cent greater than that of general street work. Property owners have heretofore been left in the dark as to what the cost of street work would be. That uniform charges may be made and the unit system applied, it was agreed that Mr. Brenner should submit a resolution to the Council through the Street Committee whereby contractors will be obliged to show the exact prices to be charged for both frontage and crossings. This proposed resolution will soon be acted on because of street work and the establishment of grades in the annexed territory, this work to be done under the new order of things.

Work of City Repair Plant

Marion, Ind.—City Engineer Thomas E. Petrie, as Superintendent of the Street Cleaning Department, has filed with Controller Coats his annual report for eight months says that at present a total of twenty-five miles of paved streets and alleys require constant attention, and all repairs are made as rapidly as possible. The figures follow:

Repaired with stone—First st., Harmon st., Wabash ave.

Repaired with cinders—Nelson st., Charles st., Short st.

Repaired with asphalt—Washington st., 1,121.5 sq. yds; Adams st., 14.5 sq. yds.; 6th st., 8 sq. yds.; Spencer ave., 307.5 sq.yds., being a total of 1,451.5 sq. yds.

The repair work was done at a cost of $1.024 per sq. yd.; this prics includes labor, material, interest at 6 per cent on plant investment as well as depreciation on plant at 10 per cent.

The asphalt plant outfit consists of the following items: One combined fire wagon and asphalt heater, $507; one mixing pan, $43; one hand roller, $65; one hand cart, tampers, and smoothers, $10; total cost of repair plant, $625. The total expense of repairs of asphalt streets for the eight months covered by the report, is shown as follows: Total cost of labor, $618.43; total cost of asphalt, $566.16; cost of Portland cement for top dressing, $6.72; cost of sand, $75.60; cost of fuel, $75.00; cost of stone dust, $36.96; cost of cartage, $6.72; total amount spent for labor and material used, $1,386.19.. To this amount is added $191.32 for repairs to plant and material on hand, making $1,580.51, which is the total expenditure on asphalt street repair work.

The total appropriation for this work was $2,500, leaving a balance of $919.46.

The appropriation for cleaning and general work on the streets was $12,000. Of this amount $11,011.98 was spent, leaving $388.02.

Kansas for Permanent Roads and Bridges

Topeka, Kan.—W. S. Gearhart, the new State Highway Engineer, is urging the appointment of a State Highway Commission, such as New York, Illinois and other States have, to look after roads and bridges. Farmers now do practically all the work on the roads, and most of it is done in the fall when the proper time for grading and working roads is in the spring. In the spring, however, the farmers are too busy to give any time away from their farms. If results are to be had, he says, there must be a regular force of road builders. In the present system of road building and working in Kansas anybody and everybody does the work and tries out his particular idea and the result is many and varied schemes of road building. County bridges and culverts are also recommended by Mr. Gearhart, as many of these structures are now washed out by floods.

New Highway Scheme for National Capital

Washington, D. C.—An entirely new scheme for the highway system of certain outlying portions of the city is in the mind of Maj. W. V. Judson, the Engineer Commissioner of the District, as evidenced by several bills which have gone to the Capitol recently. The purpose of the bills is to change the rectilinear street system in half a dozen unimproved outlying sections, and arrange to have the streets and avenues to be built to follow the line of hills and valleys. The four larger areas affected are the sections lying between Brightwood and Rock Creek Park; between the Naval Observatory and Massachusetts avenue; between Connecticut avenue extended and Rock Creek Park, and the portion of the District bounded by Broad Branch road, Rock Creek Park, Utah avenue, Northampton street and Nebraska avenue. In commenting on the scheme recently, Maj. Judson said:

In the old city as L'Enfant laid it out he adopted the rectilinear street system until he struck the foothills, and at the foothills on the north and northwest he planned a curving road, now Florida avenue. It was evidently in his mind to follow that plan in the foothills themselves. Too much straight line business has been carried out in the suburbs as it is, and this new plan will work out so that the topography of the country is followed in laying out new roads.

Some of the bills have already been approved of in the committees at the Capitol. A report was made on the Broad Branch road-Rock Creek section recently in which the Commissioners said:

The change in plan is desired by the owners of the property involved, on account of the topography of the tract, which is very rough, and which makes it very expensive and impracticable to carry out the rectilinear plan. The changes contemplated in the proposed new plan consist merely in deflecting certain streets so as to make them more nearly follow the contour of the ground.

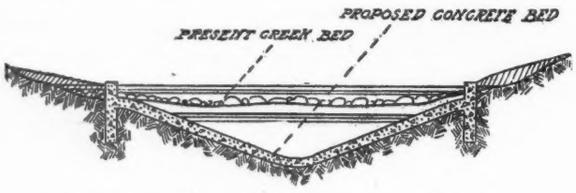
SEWERAGE AND SANITATION

Typhoid Menaces Chicago Suburbs

Chicago, Ill.—Cities and towns along the north shore are threatened with a typhoid-fever epidemic. Cases of this disease are reported in almost every community between Evanston and Fort Sheridan and the physicians are laying the blame to the usual cause—impure water. Dr. Balderson, City Physician of Evanston, stated that there were more than ten cases reported, but that this was an unusual number, while conditions are worse in Highland Park, Lake Forest and Fort Sheridan. The absence of filters at pumping stations and the polluted condition of the lake water from sewage are given as the causes.

To Improve Sanitary Condition of Creek

Harrisburg, Pa.—For years Paxton creek has been a source of trouble to the city and the citizens living along its banks. In flood times the persons living immediately in its vicinity have suffered greatly, but during droughts it has been the most annoying to the residents of the city. Not only the people living within a block or so of the stream are affected during the driest part of summer, for the stream is of such a nature that it is full of small pools and stagnent eddies which produce odors and mosquitoes



PROPOSED IMPROVEMENT TO CREEK, HARRISBURG.

that go to all points of the compass. The construction of the flood controller works in Wildwood Park has prevented the overflowing of the stream during freshets, and the controller works were also used to advantage last summer when the stream was almost an open sewer of mud with little running water. Then water was let out of the lake and the course of the creek washed. But the drought there was so protracted that it was impossible to keep up this flow steadily and during the greater part of the summer there were animated remonstrances against the Board of Health and everybody else in authority in the city regarding the fearful condition of the stream. To wipe out forever the conditions that have been a menace to the health of the city, Councils provided an item in the $1,041,000 loan measure, which was voted on favorably February 15, of $100,000 for the paving of the creek, from its source at the Susquehanna river in South Harrisburg to the upper end of the city.

Tunnel Under River for Sewer

Elizabeth, N. J.—Despite unfavorable weather conditions which have made operations on the intercepting sewer difficult, the contractors are going ahead with the work and last week a gang of men started to tunnel under the Elizabeth river. To comply with the Government specifications the engineers will have to tunnel six feet below the rock bed of the river. This depth is required to prevent interference with navigation. To get at the bottom of the river for excavation purposes, the contractors have found it necessary to build a cofferdam to keep the waters of the river from crowding in upon the men while they are at work. When the dam is filled the water is pumped out to give the engineers and their helpers a chance to excavate. The dam has been made watertight by a wall of boards, rocks and cobblestones. The width of the stream at South and Pearl streets where the contractors are building the tunnel, is sixty feet. Two eight-inch iron sewer mains will be laid. They will be encased in concrete to prevent decay. On the South street side of the street they will connect with the Fourth avenue lateral and this sewer will connect with the sewer on the other side of the river. The work at the South street end of the sewer is under the supervision of Superintendent Smith. Work on the sewer at the Summer street end is also going ahead, cableways being used. During the spring and summer months the force of men will be increased.

SPRINKLING FILTERS OPERATING DURING BLIZZARD

Sprinkling Filters Operate in Blizzard

Columbus, O.—The sprinkling filters at the sewage disposal plant have been operated successfully with little or no difficulty throughout the severe winter. The sprinklers work intermittently fifteen minutes on and three-quarters of an hour off. The accompanying photograph was taken February 17, during the heaviest snowstorm of the year, when there was already more than a foot of snow on the ground. The temperature of the air was 19 degrees F., and the wind blowing a gale. A few of the sprinklers were covered by snow but Mr. Hoover, who is in charge of the chemical and bacteriological work, was of the opinion that they were in operation under the snow.

May Utilize River Bottoms for Sewage Plant

Fort Worth, Tex.—A party of city officials headed by Mayor Davis recently went to San Antonio to inspect that city's sewage purification plant and irrigation system. The Fort Worth officials are considering a proposition for the establishment of a similar plant in this city, by means of which it is estimated that 5,000 acres in the Trinity River flats could be irrigated. The plant, it is stated, would cost $250,000 and all the company asks is a franchise to use the sewage for manufacturing into fertilizer and for irrigation purposes after it has been passed through the purifying process.

How Boston Provides for Sewers

Boston, Mass.—The city this year will have the right to borrow over $3,700,000 for municipal work, but of this amount over $1,100,000 will have to be apportioned for sewers. Under the statutes the city each year is obliged to expend one-twentieth of one per cent of its assessed valuation in the construction of sewers for the separation of sewage from storm surface water, within the watershed of Stony Brook and other water area tributary to the Charles River basin above the dam. Last year the amount ran about $665,000 and this year it will come nearer $700,000. In addition, each year another apportionment of money has to be made for general sewerage work, and Guy C. Emerson, Superintendent of Streets, this time is asking for $400,000.

Electric Current and Fertilizer from New Sewer

Rochester, N. Y.—An important possibility in connection with the proposed city-to-lake sewer is the opportunity which will be given the Irondequoit gardeners to pump sewage from the sewer for the fertilization and irrigation of their garden land, if they so desire. The route of the sewer is through hundreds of acres of rich garden land that is now held at from $800 to $1,500 per acre, and City Engineer E. A. Fisher said that the gardeners may pump the sewage out for their farms if they so desire, and they will be encouraged to do so. The sewage screening plant, which is to be about half a mile from the lake shore, is to be on a 150-acre farm and is to be operated by an electric power station located a short distance to the north of the screening plant, where a fall of 30 feet will furnish head for electric generators. If this plan is carried out, it will be the first municipal electric plant in this city. It is not expected that a large amount of power will be generated, but sufficient to run the screens and light the screening plant.

WATER SUPPLY

Meters Give Way to Flat Rate

Baltimore, Md.—That a filtration plant will be constructed for the purification of Baltimore's water supply within five years, and that every house will have a meter within the 10 years following the installation of such a plant, was the prediction of Water Engineer Quick before the Water Board. Mr. Quick was opposing the removal of a number of meters from warehouses and similar properties, where it was represented by Collector of Water Rents and Licenses Clarke that they were producing less revenue than would a flat rate. Mr. Clarke submitted a list of 369 meters, all of which, he said, produced the same or less than would be realized by a flat rate. The Water Engineer was instructed that after the readings had shown no money was being lost by the department he could withdraw the meters and make use of them otherwise. Mr. Clark had figured the city would save thousands of dollars a year by the change. He will also submit another list showing about 300 more cases where it would pay the department to take out meters and put charges for water on a flat basis.

Tapped High-Pressure Water Mains

Philadelphia, Pa.—Chief Dunlap, of the Water Bureau, has discovered and is now fighting a new scheme of beating the city out of its rightful water taxation. From the owner of one building he has settled for $3,000, and negotiations are now in progress with the owners of another building, on Chestnut street, from which he expects to recover an even larger sum. These amounts are the figures agreed upon between the owners and the Chief of the Water Bureau after he had confronted them with the proof that they were pumping water into their buildings from the high-pressure service mains without paying the city the charges supposed to be imposed therefor.

Sand Washers Installed

Wilmington, Del.—The sand-washing machine for the new filter beds has been installed and placed in operation. It cleaned the sand in one bed in five hours.

Filtration Plant Fails to Prevent Typhoid

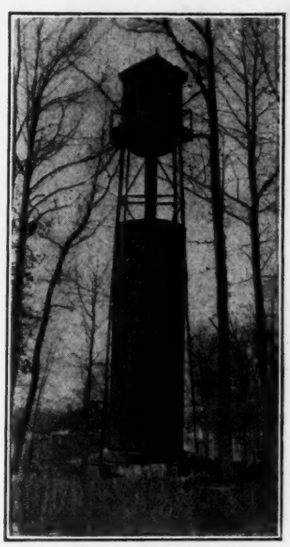
Yonkers, N. Y.—There are an unusual number of cases of typhoid fever in the city, which, according to Health Officer W. S. Coons, is caused by the failure of the filtration plant to purify the water. "The trouble lies in the pollution of Nepperhan river, from which Yonkers gets its water supply," said Dr. Coons. "This pollution is caused by the surface water which runs into the stream. The recent floods, due to melting snows, and the increased population along the stream, have brought about the unhealthy conditions. Our filter beds are not equal to the demands upon them."

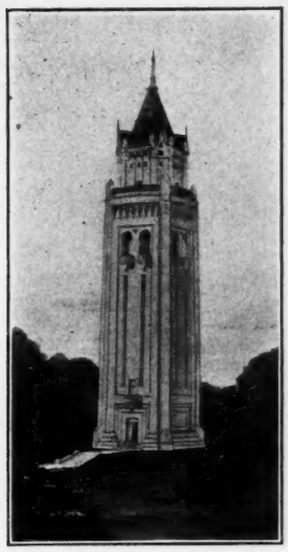
Penalty for Delinquent Water Rents

Walla Walla, Wash.—Mayor Eugene Tausick has signed an ordinance ordaining that hereafter on all water rents not paid before the same become delinquent, there shall be added a penalty of 25 cents when the water rent is payable monthly, and a penalty of 50 cents when the water rent is payable quarterly.

City to Freeze Out Private Concern

Yuba City, Cal.—The Board of Town Trustees has passed a resolution reciting, in effect, that C. B. Andros, owner of the old water system of Yuba City, is running his plant without a franchise, and against the provision of a section of the Constitution which provides that no company or individual shall supply water to any city or town without first obtaining a franchise, and ordered the City Attorney to at once begin an action against Mr. Andros to enjoin him from using the streets for the purpose of conducting, improving or extending his water system. The franchise under which Andros was conducting his system expired last September. The city has now in perfect working order a fine water system, probably as perfect and complete as any system to be found in many larger cities, but many residents still patronize the Andros system.





Courtesy Newark Evening News.

TWO DESIGNS FOR WATER TOWER

Decorated Structure Preferred to Plain Water Tank

Madison, N. J.—The borough has decided to increase its water pressure by placing a holder of 100,000 gallons capacity above the present stand pipe. Exponents of outdoor art, having an eye to property values as well, have had plans made for an ornamental cement casing for the structure, and are looking to the council for an appropriation. The tower will be 140 feet high and with the architectural design carried out will cost $7,000.

City Departments Must Pay for Water

Boston, Mass.—Mayor John F. Fitzgerald, in a circular letter, notified the heads of all the city departments that during the current year bills will be sent to each department of the city for the quantity of water used by them in city buildings, and that the charge will be based upon the regular water rates. In issuing this order, the Mayor states that he hopes to prevent waste, which has been estimated to be about $25,000 annually. The policy of charging each department for the water used is not a new one, the Mayor points out, but was the custom prior to 1900.

City Should Not Charge Itself for Water

Lowell, Mass.—The Joint Committee on Appropriations has reported to Council that it has directed the City Solicitor to "draw an ordinance providing that the Water Department shall make no charge for water furnished to other city departments. Under existing laws," the report says, "this department has exclusive handling of its income and even if it had a large surplus the other departments could not be benefited in any way. The annual expense of water to other departments is a heavy item and the amount if saved would pay for many improvements that now seem impossible. In addition to this, the Water Department expenses would be decreased because it would be deprived of just so much available money. All things considered, we believe the proposed ordinance would be excellent and timely legislation."

Mayors Pick Committee to Draft Water Bill

Paterson, N. J.—Three Mayors and representatives from two boroughs were present at the conference held in Mayor Andrew F. McBride's office last week to bring about concerted action on the part of municipalities in a movement to secure the Wanaque watershed as a source for a water supply to cities in the section. After discussion it was decided to appoint a committee to draft a bill and report it back to the general committee at a conference to be called this week, at which time a general committee will look over the bill, and if favorable try to have it introduced to the Legislature. The committee comprises Edward F. Merry, of Paterson; A. D. Sullivan, of Passaic, and Robert H. Boyd, of Montclair.

STREET LIGHTING AND POWER

City May Purchase Light Plant

Clinton, Ia.—Does Clinton want to purchase the gas and electric light plant? This question may come before the voters of the city one year from now. When the franchise was voted to the Clinton Gas Light and Coke Company nine years ago, it provided among other things that the city of Clinton might, at the end of any five-year period, purchase the plant of the company in this city. It provided for a method of appraisement, and in addition provided that in case the city desired to purchase the plant that it must give one year's notice, prior to the expiration of the five-year period, of such intent. The second five-year period will expire in 1911, and an ordinance, for the purpose of preserving the city's right to purchase, has been introduced in Council.

Reduced Rates and Better Service from City Plants

Holyoke, Mass.—Manager W. H. Snow, of the Gas and Electric Department, states that with improved apparatus and with additions at the gas works 80-cent gas instead of the present dollar rate can be sold and the works make equal if not more profit than under the present condition of manufacture and price. A loan of $125,000 is to be made, $25,000 of which is to be for the installation of new boilers and making extensions at the gas plant, to enable the reduction in price, and $100,000 for the city electric station, which is now sending out its maximum capacity.

Artificial Gas Now Had for Thirty Cents

Hamilton, O.—The Hamilton Gas and Electric Light Company announced yesterday that, beginning at once the price for artificial gas would be 30 cents a thousand cubic feet, meeting the city's price for natural gas now being furnished by the Ohio Fuel Supply Company. The former price was 70 cents a thousand cubic feet. This is said to be the cheapest price for artificial gas furnished any city in the United States. Fifteen years ago Hamilton paid $3 a thousand, and when the city built its own gas plant the price was cut to 70 cents. The introduction of natural gas a few months ago resulted in a legal battle between the city and the gas company, which is still pending in the courts, although natural gas was slipped into the city mains and is now being freely used.

How Kansas City Lets Light Franchises

Kansas City, Mo.—Another effort is being made by the Public Utilities Commission to settle the status of William M. Hall, who operates an electric light plant in his building at Ninth and Walnut streets and without a regular franchise uses streets and alleys to supply neighboring buildings. Hall's property has been built up on the strength of informal permits that have no legal standing, and he has been offered a 5-year franchise to operate between Eighth and Tenth streets and between Main street and Grand avenue to give him time to adjust himself to legal requirements. The City Electrician said he had found new lines constructed without authority and had been about to arrest Hall, but the latter forestalled him by getting a permit from the Board of Public Works.

Electric Light Plant Taxed Above Capacity

Galesburg, Ill.—City Electrician A. W. Knutson, before the City Council in speaking of the recent defective service of the city's lights, said that the trouble comes from the fact that the electric light plant's capacity is overtaxed and that the present equipment is not able to do the work, and that the council is adding new lights all the time. "It is only a matter of a short time," said Mr. Knutson, "until more equipment must be added by the city if results are to be had. There are now 346 lights in operation or 25 more than capacity. As a result the present equipment cannot keep up sufficient voltage all of the time and consequently the weaker lights or those that do not feed as easily as others sometimes go out. Besides this large number of lights there are between 75 and 80 miles of No. 6 copper wire which the current has to travel over and this makes a lot of resistance." Mr. Knutson further said that the department is short of repair men, as there are but two men, the same as when there were only half the number of lights.

Wires Underground by Next Year

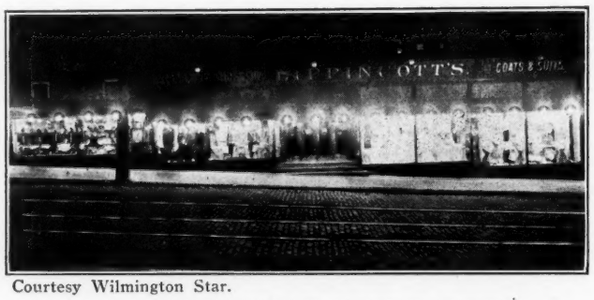
Paterson, N. J.—L. D. H. Gilmore, of the Public Service Corporation, promised before the Board of Works on behalf of his company that it would begin next year and in three years spend the sum of $100,000 in putting its overhead wires underground in the business section of the city. He said that the company could not do anything this year as its appropriations had been made and that they expected to spend $275,000 in this city in making improvements in the electric lighting service. Mr. Gilmore will have plans showing definitely what they expected to do submitted on March 15.

City to Supervise Cleaning at Gas Plant

Newport News, Va.—On account of sickness caused by fumes thrown off by illuminating gas in the houses, Mayor Maryus Jones, in accordance with a resolution of the Board of Aldermen, has detailed a city employee to supervise the cleaning each day of the purifying boxes at the plant of the Newport News Gas Company, pending the installation of the new equipment.

Brighter Streets for Wilmington, Del.

Wilmington, Del.—The brightening of Market street has been begun in earnest. Mr. Matt E. Hooper, illuminating engineer for the Wilmington Gas Company, has just completed the installation of nineteen American Junior one-burner inverted incandescent gas arcs in front of the store of Lippincott & Company, at 306 to 314 Market street, which have done wonders in lighting that section of the main street. How well the work was done is clearly shown in the accompanying photograph of the Lippincott store at night. This is the most perfect system of lighting that has ever been installed in Wilmington. The system serves a triple service—it illuminates the windows, is an advertisement of much value to the firm, and lights up the whole street before the store. The expense of this light, it is understood, is trifling, and if generally adopted would be an inexpensive way for some of the city's progressive firms to help out in the brightening of Market street.



Courtesy Wilmington Star.

NINETEEN BUSINESS LIGHTS BRIGHTEN STREET

City Wires in 'Phone Conduits

Spokane, Wash.—The Pacific Telegraph & Telephone Company has notified the Board of Public Works that it will install in its underground ducts a wire for police and fire calls. This action was taken by the corporation after a long contest with the board. The Home Telephone Company has also consented to reserve wires in its underground system for the use of the city.

High Rates from City Light Plant

Tacoma, Wash.—Nearly 90 per cent of the customers of the Municipal Electric Light Plant had complaints to make on account of the steep charges made during the first month of the year. City Electrician F. H. Lauzon declared that 75 per cent of the meters tested during the past nine months have been slow, while only about 1 per cent of them was fast. The clock meter is tested regularly at the University of Washington, and it is the intention of Mr. Lauzon to test every meter in Tacoma at least once a year in the future. The city charges 6 cents per kilowatt hour for the first 50 kilowatt hours used and 5 cents each for the next 50, making the charge per 100 kilowatt hours $5.50. After that 4 cents is charged, and any amount over 2000 is charged for at the rate of 3 cents.

FIRE AND POLICE

Police Signal System Installed

Rochester, N. Y.—Eight or nine years ago Commissioner of Public Works Owen began an investigation into the red-light police signal system and finally succeeded in securing its adoption, the first light having been used last week. Commissioner Owen, Chief of Police Quigley and Superintendent Smith tested the light and found that its green rays are visible for 1000 feet on four intersecting streets and on three patrolmen's beats. When an officer in that zone sees the light he sprints for the nearest telephone and calls up his station. The beneficial effect of this system lies not alone in its communicating values but its moral effect on criminals who shun the territory protected by the signal system, because it greatly lessens their chance of escaping after committing a crime. Commissioner Owen intends to extend its territory as fast as is possible with the funds at his command.

Prevention Causes Remarkable Fire Record

Lestershire, N. Y.—The Lestershire Fire Department has been on the alert during the cold days and nights of the present winter, but not an alarm has been sent in since late last fall, which is regarded as very unusual. Chief Banks and his corps of assistants have taken every precautionary measure to guard against fire. Hydrants in all sections of the corporate limits have been tested many times this winter by men who are not anxious to experience another costly lesson similar to the Mawson fire of three years ago. The business blocks and factories have recently undergone a thorough inspection. In several instances ash barrels and other inflammable material were ordered removed from the cellars. The past year has been a fortunate one for Lestershire in the way of few fires. It is believed that when Chief Banks submits his report to the Fire Commission this month it will show the smallest loss by fire of any year within the past eighteen. According to statistics on file in the Chief's office, the loss by fire during the past eleven months will not exceed $50. The firemen's faithfulness and the well directed work has had much to do with keeping the loss by fire in this village down to a minimum.

Surgeon for Police and Firemen

Schenectady, N. Y.—To do away with the possibility of the police officers and firemen staying off duty with the excuse of sickness when they are able to be at work, Commissioner McDonald will appoint a surgeon whose duty it will be to examine all men who claim leave of absence for sickness and make a report on the case to the department of public safety. At present the men simply present certificates from the physician whom they chose to have attend them and these have been sufficient guarantee in the past. The appointment of the inspector of small arms will be made at the same time, probably.

Firemen Get Raise of Pay

Topeka, Kan.—City Council has raised the salaries of the members of the Fire Department by a vote of 8 to 4, the clinching argument being made by Alderman Lannan, who asked: "Gentlemen, have you ever realized that the firemen receive much less per hour than any other employee of the city?" The following salaries will now be paid per annum: Marshal, $1,800; Assistant Marshal, $1,200; Captains, $1,080; Lieutenants, $1,020; Engineers, $1,080; Firemen, first-class, $960; Firemen, second-class, $780.

Police Must Keep up Reserve Duty

Trenton, N. J.—A petition from the Patrolmen's Benevolent Association, comprising all the patrolmen of the city, asking that the reserve duty required from the officers be either abolished or modified to an extent that would make it less arduous, has been refused by the Board of Police Commissioners. Each patrolman has to do reserve duty every eighth week. The shift consists of four hours' work, from 7 until 11 in the evening, every night of the week. In addition to this, each man is required to sleep at the station house every twenty-fourth week. Any action towards relieving the man of reserve duty would necessitate the addition of new members to the department.

Work of Jersey City Fire Department

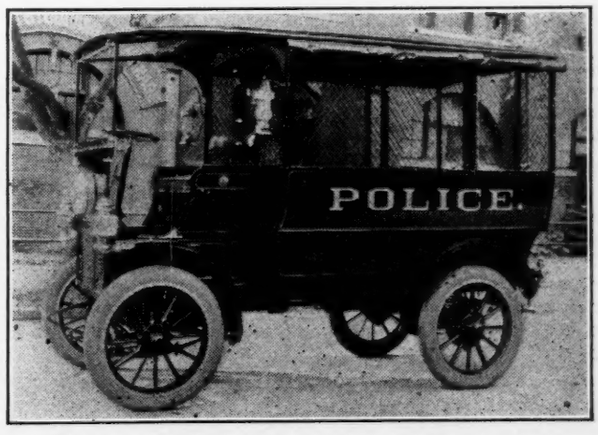
Jersey City, N. J.—Chief Engineer John Conway, of the Fire Department, in his report for the year ending December 31, 1909, to the Fire Board, shows that the fire-fighting equipment consists of sixteen steam engines, seven hook and ladders and two chemical engines, all in good condition. The hose equipment consists of 26,006 feet of two and a half inch cotton rubber-lined hose, 3,049 feet of one-inch rubber hose, 435 feet of three-quarter inch hose, and 204 feet of three and a half inch hose. Of this quantity of hose Chief Conway condemns 4,209 feet of two and a half inch hose, 435 feet of three-quarter inch hose, and 204 feet of three and a half inch hose as unfit for use. During the year 200 feet of two and a half inch hose was destroyed by fire. The Chief declares there is a shortage of 4,453 feet of hose among the various companies. He recommends the purchase of 10,000 feet of new hose annually instead of 3,000 feet, as heretofore. The Chief recommends that all companies not provided with combination hose and chemical wagons be equipped with the same at once; that flash lights for use at night time be provided for each truck company; that the Chief, the Assistant Engineer and Battalion Chief be furnished with automobiles and carry two fire extinguishers; that four combination automobile chemical wagons be purchased and that the central office system of transmitting fire alarms be adopted.

Chauffeur Police and Motor Patrols for Philadelphia

Philadelphia, Pa.—Following a test made of one of the two motor patrols to be installed by the Department of Public Safety, Chief McLaughlin, of the Electrical Bureau, announced that 150 policemen have made application to enter a school for policemen chauffeurs, shortly to be established. Chief McLaughlin believes every member of the crew on a motor patrol should know how to run the new conveyance for prisoners. Since the appropriations were made for departments by Councils two motor wagons were ordered from the Knox Automobile Company and it is the intention to gradually replace all horse-drawn patrols with the new motor vehicles. The test has proved the value of the new patrol. The bodies of the motor patrol wagons are built on the lines of the present horse-drawn vehicles, but are heavier. The tires are of solid rubber, in two sections, forming a double tire for each wheel.

Police Auto Satisfies Police Chief

Washington, D. C.—Maj. Richard Sylvester, Superintendent of Police, is well satisfied with the new automobile patrol wagon, the work of which is such that he thinks he will have little trouble in securing additional wagons of the same type. During eighty-six days the wagon has been in service it has responded to 346 calls from patrol boxes, covering 3529 squares or 206 miles, the time consumed averaging 6⅞ minutes to a run. The wagon also made 113 "miscellaneous runs." The distance covered during the eighty-six days was 467 miles. An additional chauffeur has been appointed, so that the wagon will be in service twenty-four hours a day. Maj. Sylvester finds that the expense of running the wagon is considerably less than the cost of maintaining a horse-drawn vehicle.



AUTO PATROL WITH GOOD RECORD AT NATIONAL CAPITAL

GOVERNMENT AND FINANCE

Plans City Pay Stations

Cleveland, O.—Director A. B. Lea is looking into the question of establishing city electric light and water bill collection stations at banks in outlying districts. "If the city has a legal right to follow such a plan I am in favor of it," he said. "Unless we follow the plan, Collingwood residents will have to go to the City Hall each month to pay their light and water bills." Mr. Lea also has a plan whereby permits of every description can be issued at an office on the ground floor of the City Hall building. He says at present, people calling for permits or licenses become hopelessly confused, as they are sent from office to office.

Commission Government for Arkansas Cities

Little Rock, Ark.—The movement to secure a constitutional amendment providing for a commission form of government for cities and towns of this State which desire to abolish the present system has received added strength by the hide-and-seek play enacted by the Little Rock Board of Aldermen during the past week over the selection of an acting Mayor to relieve Mayor W. R. Duley during his absence in the West, and to-day there is hardly a substantial citizen of Little Rock who will not gladly welcome the new form of government. The bill to be presented in the next Legislature has already been drafted, and copies will be sent to all the cities of the first and second class in the State for inspection. As far as heard from, the movement meets with general satisfaction, and with the exception of a few details meets with universal approval. Some of the advocates of the change desire that the officers to govern the cities shall be appointed by the Governor, while others are contending that they be elected. The bill as prepared provides that all the principal officers shall be elected and subordinate officials be appointed by the Mayor.

City Wins $40,000 Suit from Audit Company

Louisville, Ky.—The city of Louisville won in the suit for $40,000 instituted against it by the Audit Company of New York, according to an opinion handed down by Judge Evans in the Federal Court. The Audit Company sued under a contract for alleged services rendered in 1907 under the Bingham administration for examining into the affairs of the Louisville Water Company. In the court's decision it was admitted that the company had expended something like $10,000 in extra expenses in making the investigation. The two important points in the court's decision were these:

First, that the City Council, in creating a commission to examine into the affairs of the company, could only do so by ordinance when, as a matter of fact the action was taken by resolution.

Second, that the Constitution of the State forbids the city of Louisville to incur any indebtedness or make any contract involving indebtedness that is to be a charge against the revenue of any future fiscal year.

The resolution adopted by the Council by its terms, proposed that the expense of the investigation of the Water Company's affairs should be charged against a future revenue. The court made it plain that a city can only contract in a manner specified in its charter. The court held that any one contracting with a city is charged with knowledge of this fact and it is the duty of those making contracts with a city to see that the contracts conform to the charter.

Virginia Cities May Consolidate

Norfolk, Va.—The cities of Norfolk and Portsmouth may consolidate under the name of Greater Norfolk. This city has already passed an order toward this end and Col. W. H. Sargeant, Jr., Chairman of the Consolidation Committee of the Norfolk Council, brought the matter up last week before the Portsmouth Council, and President Corbett appointed a special Conference Committee of four, headed by John Howard Hall.

Adopts Commission Form

Pittsburg, Kan.—This city adopted the commission form of government on February 21 by a majority of twenty-one votes.

STREET CLEANING AND REFUSE DISPOSAL

Calcium Chloride for Streets

Chicago, Ill.—Street Superintendent Fowler, recently imported from New York to take charge of that important branch of civic duty, has decided to employ calcium chloride for laying dust in streets while they are being swept. The mixture will be sprinkled over the pavement before the brooms are used, and Mr. Fowler believes this will eliminate or at least materially reduce the possibilities of dust.

Auto Snow Shovel

Elmira, N. Y.—Residents along Park Place witnessed an unusual spectacle last week when Blynn Bryan came down the sidewalk of that thoroughfare seated at the wheel of a little Overland runabout which was busily engaged in cleaning the walks with a snow plow attached to the front of the machine. The idea proved to be a good one and the people are now thanking Mr. Bryan and the little car for the labor-saving device.

To Operate New Garbage Plant

Milwaukee, Wis.—S. A. Greely, resident engineer at the new garbage incinerating plant, has sent communications to all merchants asking them to send their refuse to the new plant in order to enable those in charge to have sufficient material on hand to dry out the furnaces.

Cleaning Streets with Legal Papers

Omaha, Neb.—Police Officer Wooldridge, assigned to the service of the Street Commissioner, has served notice on a dozen prominent business men and contractors who are alleged to be violating the ordinances by cluttering the streets with unnecessary rubbish to remove the obstructions and unsightly débris within twenty-four hours or arrests will be made. In a good many cases permits have been issued by the Building Inspector for the occupation of certain portions of the street, but some persons holding permits have presumed to take much more liberty than was intended. An effort is to be made by the Street Commissioner, working through the Chief of Police, to make dirt haulers clean the hounds and reaches of their wagons before leaving an excavation with a load.

Handicap in Removing Snow in Quaker City

Philadelphia, Pa.—Chief Virdin, of the Street Cleaning Bureau, has expended about $75,000 on snow removal, and the department has been indefatigable in its efforts. Some criticism has resulted from an inability of the department to attack the whole city at the same time, but the Chief is utterly handicapped in this, having little or no funds and compelled to depend upon those contractors who are willing to supply teams and labor and then wait months for their money.

No Collection of Rubbish in Yards

Richmond, Va.—According to Mayor Zimmerman and the Board of Public Works, it is not within the province of the Street Cleaning Department to enter the yards of homes and take ashes and other rubbish away at the request of property owners. Persons who have such accumulations about their homes are compelled by ordinance to place the same in proper receptacles either in the alleys or on the streets where it may be conveniently gotten at, and the Street Department does not propose to become backyard scavengers and clean the entire premises.

Jail for Failure to Clean Walks and Gutters

Westwood, N. J.—Council has passed a resolution recommending that 24 warrants be issued for the arrest of property owners of the borough who have refused to remove snow and ice from their sidewalks and gutters. Street Commissioner William H. Bomm reported that these 24 property owners who flatly refused to clean the sidewalks and gutters in front of their property and requested the Mayor and Council to take some action to back him up in carrying out the provisions of an old ordinance, which provides for the removal of all snow and ice within twelve hours of daylight after the cessation of a storm. The new ordinance provides that in case of failure to comply with its provisions the penalty may be a fine or imprisonment or both.

RAPID TRANSIT

Reforms on Chicago Surface Lines

Chicago, Ill.—Big changes in Chicago's surface traction lines, designed to give improved service in all parts of the city, are to be put into effect at once. Old methods of operating, which are held responsible for delays, dirty cars, careless employees and the thousands of other annoyances of the traveling public, are to be replaced by an entirely new arrangement, which will put each car under direct supervision of an executive officer of the road. On the long lines on the north and west sides, from which a large proportion of the complaints from patrons have come in the years past, the most radical changes will be made to improve the service. A new operating arrangement will be installed on the lines of the Chicago Railways Company by which the immense system will be divided into three divisions, each under a superintendent reporting directly to John M. Roach, President and General Manager, superseding the present arrangement, under which Robert R. Herzog is General Superintendent. The company is now operating 1265 cars each day over 310 miles of track and the division which is contemplated will put it into three parts as nearly equal as possible. On the south side lines the changes may be even more far-reaching.

To Regulate Trolley Traffic

Newark, N. J.—The Board of Works has passed an ordinance designed to prevent motormen from refusing to stop for passengers, except when a car is full. When it is full the conductor may put out a sign bearing the words "Car Full," and the motorman may then ignore persons waiting to get aboard. If the conductor displays the sign when there is room for more passengers he will make himself subject to a fine of $10, and the motorman will be liable to a like fine if he refuses to stop when the sign is not shown.

Milwaukee to Forbid Flat Wheels

Milwaukee, Wis.—Alderman Henry Bulder has introduced a resolution in the Common Council forbidding the use of flat wheels on street cars, as he had received petitions from many people urging him to take such steps. It is his intention to have the wheels removed at once if they become flat on trips. Five thousand steel wheels have been ordered at an expense of $100,000 by John I. Beggs.

Emergency Subway Light

New York, N. Y.—All cars in the New York subway must hereafter be equipped with storage batteries to supply lighting in cases of emergency. An order to this effect has just been issued by the Public Service Commission. The lights at present are dependent on the same current as that used for motor power.

Gasoline Motors for Owl Service

Omaha, Neb.—The Omaha & Council Bluffs Street Railway Company is figuring on the purchase of some gasoline-propelled street cars for use as owl cars on several of the principal lines of the city. Owl cars have been considered, but the expense of keeping up the power on all the lines for the operation of a few cars has been so great that the company felt the revenue would not justify the expense. Owl gasoline cars could be operated at small power expense and the big power plant could be closed down, as at present, about 2 o'clock in the morning.

Five-Minute Schedule Not Unreasonable

Tacoma, Wash.—Holding that the city ordinance requiring the Tacoma Railway & Power Company to operate a five-minute car service over the South Tacoma line during certain hours of congested traffic is not unreasonable, but is the exercise of police power given by the Legislature, Judge Easterday of the Superior Court has affirmed a $100 fine imposed by Police Judge J. M. Arntson upon Superintendent F. A. Boutelle of the street car company. The Superintendent has been charged with a misdemeanor on two counts for failing to maintain the five-minute schedule ordered by the Council. The company will at once appeal the case. Until the appeal is decided the service will likely remain as at present.

MISCELLANEOUS

Autos Must be Tagged in Ohio

Cincinnati, O.—No longer will Mayor Schwab and Chief Milliken permit owners of automobiles to drive about the streets of Cincinnati without having their new licenses and number tags. Secretary of State Carmi Thompson of Columbus, O., sent Mayor Schwab a letter stating that a number of complaints have reached his office in Columbus about automobilists being permitted to run their cars without having taken out their new numbers and licenses this year, and that it is up to the Mayors of the various cities to see to it that this is stopped.

Safety Board for Juvenile Reform

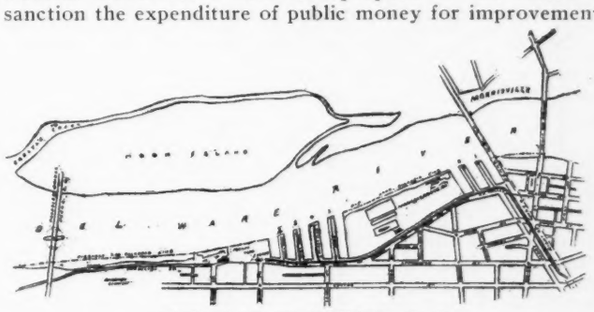
Chattanooga, Tenn.—Formal acceptance of the share of each in the juvenile reform movement has been made by the Board of Public Safety and the Committee of Five, and Commissioners Latimore and Shafer will use their influence in introducing the $15,000 appropriation movement in the Council. The committee will take up at once the appointment of a probation officer and the selection of five members of the charter organization of the Juvenile Association. Five members will also be selected by the Board, which will make a membership of fifteen on this committee.

War on Betting in Chicago

Chicago, Ill.—Chief of Police Leroy T. Steward has presented to the City Council an ordinance which makes the circulation of any pamphlet or circular containing information giving the advice or information intended to advise any one how to bet upon a contest of skill or strength between men or animals a misdemeanor, punishable by a fine of $50 to $200 for each offense. The ordinance also prohibits tips or scattering information regarding places where bets may be made. The ordinance also contains a provision prohibiting pamphlets or circulars advising persons how to bet on election contests.

Proposed River Front Improvement in Trenton

Trenton, N. J.—Joseph F. Hasskarl, Engineer of Trenton's Harbor Board, has drawn a plan of the proposed river front improvement from Ferry street to Riverview cemetery. The plans take into consideration the fact that the Federal Government does not propose in the future to sanction the expenditure of public money for improvements



DOCK PLAN OF TRENTON, N. J.

to water fronts where municipalities do not provide public terminals for traffic. Engineer Hasskarl's recommendations concerning the uses to which the several piers should be put have been approved by Council and are as follows:

Piers 1 and 2—For river commerce and passenger service. Length, 450 feet. Width, 100 feet, with sheds and single track. Designed to carry a weight of 450 pounds per square foot of deck space.

Pier 3—For coastwise traffic. Length, 650 feet. Width, 100 feet, with shed and single railroad track. Designed to carry a weight of 450 pounds per square foot of deck space.

Pier 4—For coastwise and transatlantic trade. Length, 555 feet. Width, 150 feet. Double-deck, two railroad tracks, designed to carry 450 pounds per square foot on the first or lower deck and 350 pounds per square foot on the second deck.

Pier 5—For low-grade freights, iron ore, coal, sand, gravel, etc. Length, 465 feet. Width, 100 feet. Open single-deck pier, paved with Belgian block, single railroad track, designed to carry 500 pounds per square foot of deck space.

Pier 6—For low-grade freights, iron ore, coal, sand, gravel, etc. Length, 370 feet. Width, 100 feet. Open single-deck pier, paved with Belgian block, single railroad track, designed to carry 500 pounds per square foot of deck space.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Contracts—Representations—Fraud

Board of Water Commissioners of City of New London vs. Robbins & Potter et al.—If a Board of Water Commissioners and its engineer, in printed notices and statements to contractors, and in other verbal statements corroborative of them, for the purpose of supplying information to contractors expected to act upon it in bidding on the construction of a dam and reservoir, made certain representations as to the approximate amount of work in the proposed project, such representations carried with them the assertion of being made upon some basis of superior knowledge and information, and the contractors were entitled to accept and act upon them as such; and, if they acted on the faith of them, and they were untrue, the board would be liable for a fraud, though it did not know that the representations were false. The representations of the board, involving facts not equally available to both parties, and not at hand or within the observation of contractors, and involving investigation of conditions, study and computations for which expert technical knowledge was required, if not also a search of the minds and purposes of the board members, and being made by a person in a position to have, and who assumed to have, not only a superior knowledge, but also a knowledge which had a foundation in expert examination and study, and being made for the purpose of being acted upon promptly, contractors had a right to rely upon them; and, if they acted upon the faith of the statements without personal investigation, they did not do so at their peril.—Supreme Court of Errors of Connecticut. 74 A. R., 938.

Defect in Sidewalk—Driveway

Howe vs. City of Marlborough.—Whether under the statute a city was negligent in maintaining a walk crossing a driveway without edgestone, or any slope leading to the driveway, whereby a pedestrian was injured, is a question of fact for the jury.—Supreme Judicial Court of Massachusetts. 90 N. E. R., 396.

Letting of Contracts—Discretion of Board

Baker et al. vs. State ex rel. Nolting et al.—Where, after proper advertisement for bids, and bids have been received, a resolution has been duly adopted by the Board of Public Service finding a bidder therein named to be the lowest and best bidder and directing the Clerk to notify the bidder of that fact, but before such notice has been given the resolution is, for reasons by the Board deemed sufficient, rescinded and an order made to again advertise for bids, the bid of such bidder being thereby rejected, such rescission and an order will not be treated as an abuse of discretion, and the Board cannot in such case be required by mandamus to enter into a written contract with such bidder authorizing him to enter upon the work of the improvement. The proceedings of the Board of Public Service in the advertising for bids and the adoption of a resolution defining who is the lowest and best bidder is not the making of a contract, but is merely preliminary to the making of the written contract provided for by the statute, and such contract is the only one the Board is by the statute authorized to make.—Appellate Court of Indiana. 90 N. E. R., 389.

Special Assessments—Exemptions—Cemeteries

Gouverneur Village vs. Gouverneur Cemetery Association.—Even if Village Law as amended by Laws 1898, in connection with Laws 1879, be capable of a construction authorizing a sidewalk assessment against cemeteries, which would become a lien enforceable only after the cemetery property has ceased to be used as a cemetery, it would be no complete defense, in an action against a cemetery, to compel payment of such an assessment, since, under Village Law, a judgment could be obtained, enforceable at least out of personal property of the cemetery association or corporation or land not "actually used and occupied for cemetery purposes," if such were found, and which would be a lien on the lands actually used for cemetery purposes, if at any time they should cease to be so used.—New York Supreme Court. 120 N. Y. S., 223.

Defective Streets—Liability

Stanton vs. City of Parkersburg.—Code 1899 imposes an absolute liability on incorporated cities and towns for injuries sustained on account of its public streets and sidewalks being out of repair, or obstructed in such a manner as to make it dangerous to travel thereon in the ordinary modes. In case of necessity, such city or town may permit a temporary obstruction of any of its public streets or sidewalks, but it is bound to take proper precaution to warn the public of the danger occasioned by the obstruction. When an instruction, embodying an hypothesis, dependent upon the finding of a certain fact by the jury, has been given for one party, it is error to refuse an instruction for the opposite party, stating the converse of the legal proposition embraced in the one given; there being evidence tending to sustain both theories of the case.—Supreme Court of Appeals of West Virginia. 66 S. E. R., 514.

Defect in Street—Negligence

Buckley vs. City of New York.—In an action against a city for injuries to one driving a wagon, owing to his having driven in the nighttime upon a bank of earth thrown up at the side of an excavation in the street, plaintiff testified that he saw no lights, but the evidence showed that lights were put on every night, that at least one of the lights was burning when the accident happened and that both lights had been burning ten minutes earlier. Held, that the evidence did not justify a finding that the city had been negligent. Where under a permit issued by the Street Department of a city an excavation was made in a street to repair a sewer, the city was bound to exercise reasonable care to see that it was properly guarded, and it might not absolve itself from the duty of using care by relying upon the contractor to do so, though the city was not an insurer. One injured by driving in the nighttime upon a pile of earth beside an excavation in a street was guilty of contributory negligence in having driven through the street at a furious speed.—New York Supreme Court. 120 N. Y. S., 423.

Defective Sidewalk—Water Meter Box

City of Rome vs. Brooks.—If a water meter box upon a sidewalk is for a considerable time kept alternately in a safe and in a dangerous condition (for such a length of time as that, if the condition was dangerous all the time, notice of the defect could be presumed), it would not be necessary for one injured by reason of such alternating danger to show notice or knowledge on the part of the municipality upon each recurrence of the danger; but if the condition of the danger is such that safety and danger exist intermittently it will be presumed that the recurrence of the danger was to be anticipated. Although the plaintiff in this case might have observed the defect in the sidewalk some time before, she might also reasonably have supposed that the municipality had remedied the defect in the water meter box, and it was a question for the jury to determine, under all circumstances, whether the plaintiff was so negligent as to defeat her recovery.—Court of Appeals of Georgia. 66 S. E. R., 628.

Opening Streets—Injunction.

New York & New Jersey Water Company vs. North Arlington Borough.—A water company is not entitled to an injunction against interference with its proceeding to open streets for the purpose of laying pipes where it has not applied to the Mayor of the borough for a permit, as required by a borough ordinance, though the Mayor and Council to whom the company did apply imposed unreasonable conditions on the granting of the permit.—Court of Chancery of New Jersey. 74 A. R., 973.

Defective Walk—Notice

Franklin vs. City of Worcester.—Where the evidence in an action against a city for injuries by a defective coal hole in a sidewalk warranted a finding that the stone in which the iron cover was set was worn, so that the cover was liable to be displaced when stepped on, and had been in this condition for two years before the accident, it was for the jury whether the city could not have had reasonable notice of the defect by exercising proper diligence.—Supreme Judicial Court of Massachusetts. 90 N. E. R., 414.

NEWS OF THE SOCIETIES

Associated Municipalities of Florida.—Permanent organization was effected by the convention of mayors and councilmen held in Tampa, February 16-17, a constitution was adopted, and it was agreed that the body should be called the Associated Municipalities of the State of Florida. The general policy of the association was carefully outlined, additional officers elected and adjournment then taken until next year. The meeting opened with President Jackson in the chair, the first business attended to being the appointment of committees, the committees as selected the day before being slightly modified, as follows:

Committee on Finance—John Hansbrough of Tampa, H. L. Swatts of Lakeland, A. T. Triay of Palatka.

Committee on Sanitation—J. D. Wadkins of Micanopy, J. N. Holmes of Tampa, J. J. Hadley of Mayo.

Committee on Fire Protection—A. Y. Teachey of Wauchula, W. E. Parmenter of Orange Park, W. E. Stoops of Umatilla.

Committee on Police Protection—H. A. Regener of Tampa, A. Usina of Palatka, Mr. Elwell of Winter Garden.

Committee on City Ordinances—J. H. Gillespie of Sarasota, J. L. Hogan of Tarpon Springs, J. L. Hull of Winter Garden.

Committee on Legislation—Dr. J. D. Wadkins of Micanopy, W. H. Jewell of Orlando, A. Usina of Palatka, F. L. Wing of Tampa, G. B. Wells of Plant City.

The object of the committee on legislation, as outlined by President Jackson, was to formulate a code of general municipal and corporation laws, to avoid so much legislation by the legislature with reference to amendments of city and town charters, and to give to the people at home the power to make their own charters and rules themselves. As it is now at each session of the legislature it is burdened with proposed amendments from the various towns and cities of the State, when the members of the legislature often know nothing about which is wanted and the people of the towns are not given an opportunity to express themselves.

Dr. Wadkins moved that there be added to the permanent organization three additional vice-presidents, a treasurer, and an executive committee of five members. President Jackson then appointed Dr. Wadkins, G. B. Wells and A. F. Turner as a nominating committee to submit names for gentlemen to fill these offices. The meeting adjourned for ten minutes for the committee to make their selection. The committee submitted the following nominations:

Dr. J. D. Wadkins, First Vice-President; Second Vice-President, Gen. W. H. Jewell of Orlando; Third Vice-President, A. Usina of Palatka; Fourth Vice-President, A. Y. Teachey of Wauchula; Treasurer, J. J. Handley of Mayo.

Executive Committee—S. E. Hope, G. B. Wells, O. Falk, J. L. Hull, W. E. Parmenter.

The report of the committee was adopted and these gentlemen made permanent officers of the organization, those having previously been elected being:

President, W. K. Jackson of Lakeland; Vice-President, Mayor F. L. Wing of Tampa, and Secretary, H. L. Swatts of Lakeland.

G. B. Wells spoke briefly in favor of legislation for three classes of municipal government, and urged uniform legislation for these three classes. In the first class he placed that affecting cities such as Jacksonville, Tampa, Key West and Pensacola; in the second class cities like Orlando and Ocala, and in the third class the smaller towns and villages, which do not require such a complex form of government.

General Jewell spoke briefly on the necessity and importance of municipal improvements and the beautifying of the cities. He told what Orlando had done in the way of street paving, and of the immense saving made by the city doing this work itself, rather than letting it by contract. He urged the necessity of plenty of city parks, and of all possible means of beautifying the cities and towns.

Municipal League of Kentucky.—An organization of the League, composed of the Mayors, City Attorneys and City Solicitors, was completed at Frankfort, February 21, and the rules and by-laws to govern the same were adopted. The rules provide that there shall be a President, six Vice-Presidents, one from each class of city in the State; an Executive Committee of six, a Secretary and Treasurer. Mayor James H. Polsgrove, of Frankfort, was elected President, and James Campbell, City Solicitor of Paducah, is the first Secretary. A number of bills were discussed, the most important of which were an act to relieve cities from suits for personal injuries; an act to authorize cities to enforce the collection of taxes in the same manner that the county and State taxes are enforced, and an act to exempt cities from county road taxes, where the cities keep their own roads and highways. This last bill was prepared on the idea that if the city has to help pay for county roads then the county ought to help pay for the city streets. A meeting of the Executive Committee likely will be held in a few days and the legislation to be pushed during this session of the Legislature will be decided on. Those present at the meeting were: Mayor Head, of Louisville; Mayor Lambert, of Owensboro; City Attorney Collins, of Maysville; Mayor Ridgeway, of Falmouth; Mayor Meacham, of Hopkinsville; City Attorney Barton, of Falmouth; City Attorney Montgomery, of Georgetown; Mayor Smith, of Paducah; City Attorney Sachs and Mayor Young, of Eminence; Mayor Swinford, of Cynthiana; Mayor Polsgrove and former Mayor Hume, of this city.

International Association of Chiefs of Police.—The convention of the Association will take place in Birmingham, Ala., May 10 or 17, the date having not yet been definitely determined. There is to be a floral parade in the city about May 17 and the citizens are anxious that the convention be held about that time. Maj. Richard Sylvester, Washington, D. C., is president and Harvey O. Carr, Grand Rapids, Mich., secretary.

Commercial Club of Cincinnati, O.—At a meeting February 19, Calvin W. Hendrick, Chief Engineer of the Baltimore Sewerage Commission, delivered an address on sewerage at the special invitation of President W. S. Rowe of the Commercial Club, who made a special visit to Baltimore to invite him. Introducing the subject by declaring that the purity of the water supply was the greatest conservation problem confronting the nation, he went on to discuss the general considerations affecting the problem. There are political considerations affecting interstate and even international relations, and technical considerations, such as character of the sewerage, domestic or manufacturing, chemical constitution and method of treatment. Comparing the conditions in Baltimore and Cincinnati, in the former city the sanitary system was planned new throughout, whereas in Cincinnati it will be necessary to consider the existence of services now in place.

Iowa Good Roads Association.—The program for the convention, Des Moines, March 8, is as follows:

Tuesday, March 8, 1:30 p. m.—Call to order, by Gov. B. F. Carroll. Music by Woodman Quartet. Temporary chairman's address. Appointment of Committees on Credentials, Resolutions. "Improvement of Iowa Roads with Materials and Means at Hand," Prof. A. Marston, dean of division of Engineering, Iowa State College; "Road Drainage," Henry Haag Jefferson; "Fixed Per Cent of the Township Levy for Dragging," John W. Foster, Guthrie Center; "Permanent Roads," Harvey Ingram, Des Moines; "Necessity of Trained Supervision," Senator Frederic Larrabee, Ft. Dodge. 7:30 p. m.—Joint meeting of Iowa Thrashermen and good roads delegates; music, T. Fred Henry's band; called to order, President J. C. Gunn; Invocation, Rev. Harry Keats, Friends' Church; Address, President Gunn; address of welcome, Gov. B. F. Carroll; response, J. C. Cottrell, President Iowa Thrashermen's Association; music, "America;" address, Lafayette Young, Sr.; address, "What to Do Now," H. C. Wallace; address, "The Thrashermen and the Roads," W. H. Trueblood; address, C. F. Curtiss, Ames.

Wednesday, March 9, 9 a. m.—"Main Road Approaches in Cities and Towns and the Use of the County Road Fund," Col. W. F. Baker, Council Bluffs; "Organized Road Dragging," Wm. Dawson, Parkersburg; "Good Culverts an Essential," George F. Johnson, Hudson; "The Land Owner's Interest," H. G. McMillan, Sioux City. 1:30 p. m.—"Business System as Applied to Road Improvements," James Atkinson, Des Moines; "The County Engineer," Hon. F. A. O'Connor, New Hampton; "Some Iowa Object Lessons," T. H. MacDonald; "Organization of Road Building Under County Supervision," W. R. Lewis, Montezuma. Report of committees. 7:30 p. m.—Open meeting of Thrashermen's Association at which Attorney General Byers will be the principal speaker.

Asheville and Buncombe Good Roads Association.—At the annual meeting of the Asheville and Buncombe County Good Roads Association all of the officers were re-elected. E. C. Chambers is president, Dr. C. P. Ambler is vice-president, and B. M. Jones, secretary and treasurer, and these, with F. Stikeleather, F. W. Thomas, Dr. C. V. Reynolds, Dr. S. W. Battle, Dr. E. B. Glenn and John A. Campbell, constitute the board of directors. The association is in good financial condition, having a balance on hand February 1 of $484.84. The association during the year has been instrumental in maintaining 18 miles of driveway around Asheville, and causing the County Commisisoners to erect mile posts and sign posts throughout the county. The association approved the action of the State Good Roads Association in asking that the State aid the counties in good roads work by contributing half as much money as the counties raise. The association also voted to require all the candidates for the Legislature to go on record concerning State aid in road work. President Chambers and Secretary Jones were appointed to confer wtih Dr. Joseph Hyde Pratt, State Geologist, concerning a meeting to be held in Hendersonville to boost the Asheville-Greenville highway. The early completion of the Asheville-Charlotte highway was urged.

Jefferson County (Ala.) Good Roads Association.—The Executive Committee met in the Chamber of Commerce, Birmingham, February 9, and received a report on resolutions and plans of procedure drawn by a sub-committee composed of F. Y. Anderson, Chairman; J. A. Rountree, William Hood, C. B. Rodgers, J. C. Waldrop and J. E. Dedman. The committee also met in the office of Major Anderson, outlined the plan of campaign and drew a set of resolutions calling on the good roads advocates of Jefferson county to support men for the Legislature who are in favor of good roads legislation.

Ohio Engineering Society.—The society is urging the enactment of a law to provide for the examination and registration of civil engineers. Their idea is that it should not be possible for anyone to be elected county surveyor or to be made city engineer without having a certificate of his proficiency in engineering. Originally the county surveyor was, as his name indicated, only a surveyor, but now, by statute, he is given charge of all the county engineering. The difficulty in the matter is to get around the constitutional provision that the qualifications of an officer shall be only those of an elector. Professor C. E. Sherman, of the civil engineering department of the State University, says that on several occasions men have come to the university and a few months after have been elected county surveyors. Of course it is impossible to master the subject in that short time.

Iowa Engineering Society.—The twenty-second annual meeting of the society was held at Cedar Rapids, Ia., February 16-18, with an attendance of thirty members. President C. T. Wilson, Waterloo, opened the meeting, and Mayor Matt Miles delivered the address of welcome. The Mayor laid great stress on the fact that the society is a body upon which municipal development in the State depends. C. P. Chase, Clinton, responded. President C. T. Wilson delivered the annual address, speaking of the progress of the society and its duties to the municipalities. George D. Dobson, secretary of the Iowa waterway, drainage and conservation commission, gave an account of the objects of the commission. Seth Dean read the report of the committee on surveying and drainage. J. H. Chubb read a paper on concrete construction in cold weather. Prof. A. H. Ford read a paper on "Rates for Electric Service." On the second day of the convention Prof. A. Marston, of Ames, read the committee report on sanitary engineering. T. H. Macdonald presented the report of the committee on roads and pavements. An excursion was made to Iowa City, where a report was read from the committee on railroad engineering by W. G. Raymond, and an address on illuminating engineering by L. P. Spinney. The following officers were elected: President, T. R. Warriner, of Cedar Rapids; Vice-president, Seth Dean, of Glenwood; directors, L. P. Spinney of Ames, and S. N. Williams, of Mt. Vernon.

Southern Gas Association.—The second annual meeting of the association was held at Chattanooga February 16-18. In the absence of Mayor T. C. Thompson, ex-Mayor A. W. Chambliss made the address of welcome. The following papers were presented: "The General Manager of a Gas Company in a Small City or Good-sized Town," W. G. Leet; "The Use of Tar on Roads," A. D. Whittaker; "Gas Coals from the Big Hill District," Harry P. Jones; "Selling Coal in Small Southern Cities," E. M. Osbourne; "Problems in Gas Illumination," by Norman Macbeth. In his paper on road tarring, Mr. Whittaker gave the figures of cost for applying a half and half mixture of coal tar and water gas tar in Atlanta. "The cost of sprinkling the streets with tar we found to be about one-third of a cent per gallon of tar. This covers the cost of the driver, sweepers and team. We charged three cents per square yard for the work complete and we have lately raised the price to five cents per yard. We netted at this price six cents per gallon for the tar."

Montgomery, Ala., was selected for the next annual meeting of the association, in April, 1911.

Officers elected were as follows: President, H. W. Frund, Salisbury, N. C.; First Vice-President, H. B. Hoyt, Jacksonville, Fla.; Second Vice-president, R. J. Chambers, Montgomery, Ala.; Secretary, James Fererer, Rome, Ga. (re-elected).

American Water Works Association.—The thirtieth annual convention of the association will be held in New Orleans, April 26 to 30. Headquarters will be at the Gruenwald Hotel, where ample and convenient arrangements have been made for the secretary's office, meeting rooms and exhibition rooms, all on one floor. The Southwestern Passenger Association have granted a rate of a fare and one-third plus 25 cents for the round trip. Application has been made to the other passenger associations for rates. The entertainment features will be in charge of the Water Works Manufacturers' Association, and will include a visit to the new water works and sewage disposal plants of the city of New Orleans, which have just been completed at an expense of about $38,000,000. The usual number of papers are being prepared for this occasion. There will also be an experience meeting, at which a number of short papers will be presented and discussed, and a general talk had on water works management. The question box will also be taken up at this session, if time permits. The full program will soon be made out, and will be announced a little later. As outlined at present, it is about as follows:

Monday, April 25—The secretary's office will be open for registration during the day.

Tuesday, April 26—At 10 a. m. the association will be welcomed by his Honor, the Mayor of New Orleans, who is also president of the Sewerage and Water Board. This will be followed by the president's address, and reports of committees. The afternoon session will be devoted to continued reports of committees and reading of papers. In the evening, instead of the usual formal reception, an informal evening is proposed. This will be opened by George G. Earl, who will give an illustrated lecture on the New Orleans sewerage and water works. After this lecture refreshments will be served and the floor cleared for dancing.

Wednesday, April 27—Morning session, reading and discussion of papers. In the afternoon a trip to the New Orleans pumping station and filter plant. Lunch will be served at the pumping station.

Thursday, April 28—Morning session, reading of papers. Afternoon, some form of entertainment, probably a trip on the river. In the evening a theater party.

Friday, April 29—Morning, afternoon and evening wil be devoted to reading and discussing papers.

George G. Earl is chairman of the local committee, of which Col. L. H. Gardner and John T. Eastwood are the other members. The exhibits will be in charge of the Water Works Manufacturers' Association, R. E. Milligan, secretary, 15 Broad street, New York.

Very reasonable rates have been secured at the Gruenwald Hotel. The St. Charles and the Denechaud, both very near the Grunewald, have also quoted reasonable rates. Arrangements are already being made for excursion parties from New York, in charge of F. W. Sheppard, of "Fire and Water Engineering," 136 West 22d street, New York; from Chicago under the direction of F. J. Bradley, 318 Dearborn street. Alexander Milne, Superintendent of Water Works, St. Catharines, Ontario, Canada, is arranging for an excursion from that vicinity, probably starting from Buffalo.

New England Water Works Association.—The March meeting will be held at the Hotel Brunswick, Copley Square, Boston, on March 9. The programme follows:

10 o'clock. The Headquarters in Tremont Temple will be open for the use of members. 11 o'clock. Meeting of the Executive Committee at the Headquarters, Tremont Temple. 1 o'clock. Lunch will be served at Hotel Brunswick, Copley Square. Tickets, $1.50, to be had at Headquarters during the morning and later at the Hotel. Topical Discussion. Members are requested to present verbally anw practical question for discussion, or submit same in writing before the meeting. 2.30 o'clock. The following papers will be presented: "Double Filtration of Polluted Waters," by H. W. Clark, Chemist, Massachusetts State Board of Health, Boston, Mass.; "Mediæval Times of Germany," Illustrated, by Desmond FitzGerald, C. E., Boston, Mass.

There will be a special meeting of the association at Hartford, Conn., Wednesday, April 13, 1910. Willard Kent, Narragansett Pier, R. I., is secretary of the association.

Municipal League of Niagara Falls, N. Y.—The league has elected these officers: President, Harry W. Kellogg; vice-presidents, E. O. Babcock and John Lynch; secretary, George W. Hoak; treasurer, Augustus Meas. The members went on record as opposed to the Mayor's proposed police bill, which is before the Legislature, particularly as regards taking from the Mayor the right of removal.

Civic Bureau of Toledo, O.—The Civic Bureau of Toledo has elected the following officers: W. C. Longnecker, president; W. C. Carr, W. H. Tucker, vice-presidents; Frank Geer, treasurer; A. C. Fischer, secretary. It was the unanimous opinion of all present that an educational propaganda be launched at once and that a series of lectures be devised to present generally and before such organized bodies as desired them. The Civic Bureau of the city of Toledo, conducted under a board of supervisors, is a separate movement. The Civic Bureau is an organization which every citizen can join. At the next meeting of the Board of Federation it is hoped to give this larger movement, which anticipates the co-ordination of all organizations and their plans, a name befitting the Greater Toledo movement.

Calendar of Meetings

March 8-9.

Illinois Water Supply Association.—Annual meeting, University of Illinois. Champaign.—Edward Bartow, Secretary, Urbana, Ill.

March 9.

New England Water Works.—March meeting, Hotel Brunswick, Boston, Mass.—Willard Kent, Secretary, Narragansett Pier, R. I.

March 9-11.

Iowa Association of Cement Users.—Annual meeting, Cedar Rapids, Ia.—Ira A. Williams, Secretary, Iowa State College, Ames, Ia.

March 16.

American Society of Civil Engineers.—Regular meeting, Society House, New York.—Charles Warren Hunt, Secretary, 220 W. 57th st., New York, N. Y.

April 26-30.

American Water Works Association.—Thirtieth annual convention, Gruenwald Hotel, New Orleans, La.—J. M. Diven, Secretary, Charleston, S. C.

May 6-7.

Appalachian Engineering Association. Annual meeting, Winston-Salem, N. C.—Harry M. Payne, Secretary, Morgentown, W. Va.

October 11-16.

American Society of Municipal Improvements.—Seventeenth annual convention, Erie, Pa.—A. Prescott Folwell, Secretary, 239 W. 39th st., New York, N. Y.

PERSONALS

BEEBE, GEORGE H., Superintendent of the Water Bureau of Syracuse, N. Y., has been reappointed, and Mayor Edward Schoeneck has demanded that better methods be installed in the department.

BALLANTYNE, WALTER, Councilman of Boston, Mass., has been elected Chairman of the new Council, and is acting Mayor during the absence of Mayor John F. Fitzgerald, who has gone to Palm Beach, Fla., to recuperate, but he will also devote much time to the preparation of the annual budget.

CARPENTER, GEORGE A., Pawtucket, R. I., has been re-elected City Engineer.

CHARNOCK, FRED R., Medford, Mass., has been reappointed City Engineer.

CORTELYOU, SPENCER V., Assistant Engineer of the Highway Commission of Los Angeles, Cal., has been appointed to be Chief Assistant, at a salary of $200 per month, and the work will now be divided into districts, with a Division Engineer in charge of each.

DEARTH, WILLIAM, Hamilton, O., has been appointed Chief of Police, succeeding Fred Strodbeck.

GALLOWAY, ALEXANDER, Los Angeles, Cal., has been named as Chief of Police. He is a railroad man, having been superintendent of a number of lines.

HILL, WILBUR, City Engineer of Gadsden, Ala., and also County Surveyor, has resigned the latter position on account of his multitudinous duties, and T. W. Lister has been named for the place by the Board of Commissioners of Etowah County.

JOHNSTON, HENRY A., and Charles E. White, Norfolk, Va., have been elected Aldermen, vice Titus B. Knight and W. H. Moreland, resigned. Johnston is a lawyer and son of Robert Johnston, until recently Chairman of the Board of Control of the city.

LEHMAN, DR. S. J., Chief of the Fire Department of Midway, Ky., has resigned after several years' service.

MAHOOD, JOSEPH, Mayor of Benwood, W. Va., for two terms, has been defeated for renomination by Col. Robert Smith, member of Council, by five votes, and Detective Luke Garvey has been named as Chief of Police.

OPDYKE, L. E., 117 East Sixty-ninth street, New York City, is president of the Improvement Association of Bar Harbor, Me., which contemplates the erection of an incinerating plant at the resort in the spring, and which is also seeking to have certain land purchased at this time for use of parks in the future, thus keeping it out of commercial hands.

OWSTON, C. W., Manager of the Fuel Oil Department of the Standard Oil Company, whose ideas were largely responsible for the use of crude oil on roads, passed away recently in New York City.

PRIESTMAN, GERALD, has been engaged by Merritt & Company, of Camden, N. J., as manager of sales for their department of hydraulic specialties. Mr. Priestman was formerly with Pugh & Hubbard, Consulting Engineers of Philadelphia and later sales manager for a well-known New York company.

RICHARDSON, JOHN H., Oneida, N. Y., formerly Mayor, has been appointed Superintendent of Public Works.

RUTLEDGE, SAM, was elected City Engineer of Winchester, Ky., with a salary of $150 per month, by the City Council, but Mayor J. A. Hughes vetoed the ordinance, holding that Council had no right to delegate its own powers as well as those of other city officials, that it imposed duties upon one man which could not properly be performed by three, and that it agreed to pay the man three times as much for his services as either the Mayor, City Attorney or Judge of the Police Court received.

SLOCUM, CHARLES M., Springfield, Mass., has been re-elected City Engineer.

STEPHENS, WILLIAM D., former Mayor of Los Angeles, Cal., and Maj. Henry T. Lee, have been appointed members of the Board of Water Works Commissioners by Mayor Alexander, succeeding Gen. H. M. Sherman, removed, and John J. Fay, Jr., term expired.

SYKES, BASCOM, Portsmouth, Va., formerly City Engineer, has opened an office in the Seaboard Bank Building, Norfolk, for general engineering work. His successor at Portsmouth is V. O. Cassell, Jr.

SYMONS, COL. THOMAS W., Pittsburg, Pa., has taken up the duties of the office of Chief Engineer of the Pittsburg Civic Commission, to which he was recently elected.

TIFFANY, NELSON O., Buffalo, N. Y., of the firm of Tiffany & Gail, recently dissolved, has opened an office at 13 Erie County Bank Building for general civil and contracting engineering work, including foundations, reinforced concrete, buildings, reservoirs, tunnels, docks and breakwaters.

UNDERHILL, ARTHUR, has resigned the position of Landscape Engineer of the Board of Water Supply of New York City, which he has held for a number of years, in order to devote himself entirely to private practice.

WELD, HOWARD EVARTS, Chicago, Ill., Landscape Architect, delivered an illustrated lecture at Fort Smith, Ark., on "A More Beautiful Fort Smith."

WURZLOW, CALVIN, Houma, La., has been re-elected Mayor, and F. X. Zeringer, Chief of Police.

Mayors have been elected as follows in Pennsylvania cities:

Franklin, Robert F. Glenn over James B. Borland.

Hazleton, Charles Bruch, without opposition.

Lancaster, Frank B. McClain, over John M. Moore.

Meadville, Francis M. Graff over Sook.

Pittston, M. E. Golden over Joyce.

INCORPORATIONS

Antigo Gas Company, Antigo; capital $75,000. Incorporators: J. C. Spencer, H. A. Kohl, Richard Koebe.

Homer City Electric Co., Homer City, Ind. county, Pa.; capital $5,000.

Kellastone Paving & Public Utilities Co., Terre Haute, Ind.; to manufacture paving blocks. Incorporators: D. L. Watson, president; E. F. Kellie, vice-president; J. H. Clay, treasurer; J. B. Cahill, secretary; and E. B. Schmidt, chief engineer.

Penn Yann Flexible Conduit Co., Penn Yann, Yates Co., N. Y.; manufacture electrical conduits, insulators and supplies, etc.; capital, $75,000. Incorporators: Wm. T. Morris, Geo. S. Sheppard, and Jerome S. Wheeler, all of Penn Yann, N. Y.

Prospect Rock Gas Company, Wilkes-Barre, Pa.; $5,000.

Queens & Nassau Contracting Co., New York, N. Y.; general contracting; freighting, etc.; capital, $50,000. Incorporators: Edwin C. Mulligan, Scott McLanahan, Richard J. Doyle, all of No. 125 Broadway, New York.

Rancocas Cement Brick Company, Trenton, N. J.; capital, $300,000.

Scottdale Electric Company, Scottdale, Pa., capital, $5,000.

United Gas Light & Manufacturing Company, Wilmington, Del.; capital, $1,000,000.

Vanderstucken Ewing Construction Company, Bethlehem, Pa.; capital, $50,000.

York Electric Companies, York, Pa.; six electric companies to operate in York county, with offices in York; capital of each, $5,000 and same incorporators; C. A. Greenawalt, J. J. Gerry and H. B. Waltman, of York.

TRADE NOTES

Cast-Iron Pipe.—Chicago: There is a good run of inquiries from jobbers, and the railroads are inquiring for culvert pipe. Quotations: 4-inch, $28.50; 6 to 12-inch, $27.50; 16-inch and up, $26.50. Birmingham: Local foundries are running full time. Quotations: 4 to 6-inch, $25; 8 to 12-inch, $24; over 12-inch, average $23. San Francisco: The tonnage booked for coast shipment is gradually increasing. Quotations: 6 to 12-inch, $36. New York: The market is much more active. Inquiries and business in sight amounts to 20,000 tons. Quotations: 6-inch, $25.00 to $25.50.

Lead.—Market is firm and higher on increased bids, and a large business in the open market. New York, 4.60c. to 4.70c.; St. Louis, 4.425c. to 4.50c.

Cement.—There continues a large movement of supplies on outstanding contracts for local and export accounts. Inquiries for spring deliveries are larger and in some instances large manufacturers, according to reports, have booked fairly good orders for the past week at unchanged, firm prices. For export transactions covered about 3,500 bags and about 28,000 barrels. Quotations: Portland, per barrel, $1.43.

Conduits.—The Safety Insulated Wire and Cable Company, 114 Liberty street, New York, N. Y., is prepared through its construction department to undertake the complete installation of electrical subways. This includes the building of conduits, manholes and handholes, as well as the manufacturing, drawing in and connecting up of cables and the furnishing and placing of junction boxes, terminals and other cable accessories. It is prepared to take a contract to turn over a system complete to the owners. The work embraces the following fields:

Electric Light & Power Systems.
Railway Signal Systems.
Street Railway Feeder Systems.
High Tension Transmission Systems.
Municipal Fire Alarm and Police Signal Systems. Commercial Telegraph, Protective and other Signal Systems.
Park and Boulevard Lighting Schemes.
Real Estate Development Lighting.
Private Estate Lighting Systems.
Distributions for Private Charitable Institutions.
College Distributing Systems.
Distributing Schemes for Municipal, State or Federal Institutions.
Light and Power schemes for Private Industrial Plants, Shipyards, etc.

Their engineering department is prepared at any time to furnish advice on both the general layout and the details of construction, also the type and dimensions of cables needed, together with estimates on the cost of complete work. The engineers are familiar with all styles of construction and are prepared to recommend the most economical and efficient.

Contractors' Tools and Machinery.—In order to insure efficient service to their New York trade the Harold L. Bond Company, 383-391 Atlantic avenue, Boston, Mass., has established a separate corporation to be known as the Harold L. Bond Company of New York, located at 27 Coenties Slip. Howard O. Weaver, who has been engaged in the contracting business for the past ten years, is manager. It is their intention to carry there a well-assorted line of contractors' tools and supplies, where contractors and others engaged in construction work may secure prompt service, good quality of material and fair prices. They are very confident that New York contractors will appreciate such service.

Oil and Asphalt Distributor.—The G. F. W. Co., 105 Spring avenue, Saratoga Springs, N. Y., manufactures the "Perfection" Oil and Asphalt Distributor. The machine consists of a sheet steel tank 3 feet by 7.6 feet, with fire box under the whole length of the tank. One flue leads through the boiler, and another one through a stack. One five-horsepower boiler, 140-gallon water tank to supply boiler. One intermediate reservoir, steam heated, is connected to distributor by a series of small pipes in each of which is a valve to control the flow to any desired quantity, to the distributing apron, which is also steam heated, thereby maintaining the temperature until the oil is within four inches of the ground. The distributing apron is a device composed of two aprons set in shape of a letter V, within which is a steam pipe for the double purpose of heating the oil and also for spreading the flow from the series of small pipes. The front apron is of sheet steel and the rear one of thinner material, and is so arranged with set screws to adjust the opening slot at the bottom of the V-shaped distributor, so as to control the flow and hold the oil in a sheet which remains in an unbroken state until it reaches the ground. The thickness of this sheet is controlled by two levers operating the valves in small pipes and so controlling the flow of oil into the distributor at the will of the man operating the machine. The distributor is made in two sections—one spreading four feet and the other one two feet, six feet in all when both are open. This enables it to cover any width from two feet to any width desired; also to allow the operator to place the oil on the center of the road thick, and the edges thinner, if so desired.

Harris Paving Brick.—The Moores Coney Co., of Cincinnati, O., has purchased the controlling interest in the Harris Brick Co., and an entire new line of brick machinery is being installed to manufacture the Harris pavers. The plant should be in operation about April 1. Mr. Ellsworth Ogden, of Columbus, who has had a wide experience in the brick business, is in charge of the reconstruction and will remain in charge of the plant. Mr. Peter Gorter will have charge of the sales department. The plant is located on the Belt line with direct connection with the B. & O., Hocking Valley, Penn. and the Wabash systems.

Paving Brick.—Four cars of paving brick are being shipped each day now from the paving brick plant at Buffalo, Kan., to Hutchinson. This is the brick for paving the downtown section of the city. R. B. Shadduck, who has the contract for unloading, is keeping three wagons and a force of men busy emptying the cars and is piling the brick along the curbs on the sections of street to be paved. It will take about 275 carloads of brick to complete the contracts in Hutchinson this spring.

Collapsible Form.—Don O'Connor, Superintendent of the Hartford Paving and Construction Company, Hartford, Conn., has patented a collapsible form that was developed for concrete sewer contracts taken by the company. The lagging of the form is carried by hinged ribs. Each rib is hinged at the bottom, just over the center of the invert, and the two halves are held by a toggle joint at their upper ends. The top of the arch is formed on an independent section, placed on the hinged ribs after the latter have been adjusted in place.

Concrete Standpipe for Storing Water.—The town of Emplame, Mexico, and the shops of the Cananea, Yaqui River & Pacific Railroad, now a part of the Southern Pacific Railroad of Mexico, also located there, are being supplied with water stored in a reinforced concrete standpipe, 90 feet high and 30 feet in diameter. The flow of water into and out of the standpipe is regulated by a Golden-Anderson controlling altitude valve, manufactured by the Golden-Anderson Valve Specialty Company, Pittsburg. Around it there is located a standard 18-inch swing check valve. All flow into the tank passes through the altitude controlling valve which governs the elevation of the water in the standpipe, preventing it from overflowing and also acting as a stop when fire pressure is wanted in the mains. All flow out of the tank, when the altitude valve is closed, is through the 18-inch swing check valve, which, of course, closes as soon as flow starts into the tank. Golden-Anderson controlling altitude valves are also used on a steel standpipe of 160,000 gallons capacity at the Washington, D. C., terminal of the Pennsylvania Railroad Company and on the 300,000-gallon standpipe of the New York Central system, Buffalo, N. Y., in addition to many other smaller installations in various parts of the country.

Asphalt Plant.—Hetherington & Berner, Indianapolis, Ind., have closed a contract with the city of Denver for a municipal asphalt paving plant to cost $17,150. Hitherto the city has purchased asphalt mixture for repair work from a local company, putting their own expert in the yard to superintend the preparation of the mixture.

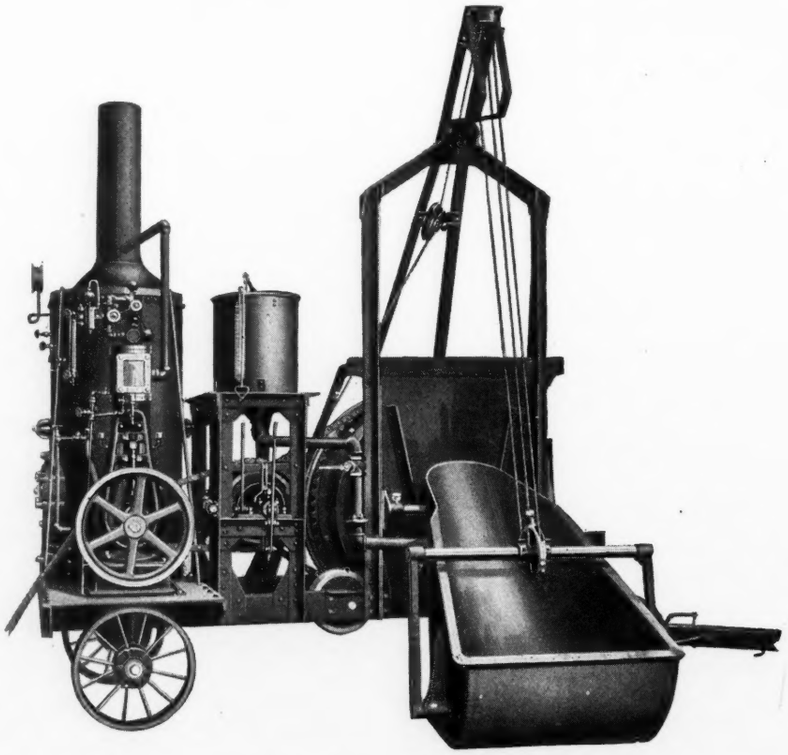
Parsons Excavator.—The sales department of the G. W. Parsons Company, manufacturers of the Parsons Trench Excavator, under George F. Lambert, sales manager, has been transferred from Des Moines, Ia., to the home office at Newton, Ia.

MUNICIPAL APPLIANCES

Chain-Belt Concrete Mixer

THE Chain-belt Concrete Mixer is a batch mixer of the non-tilting or chute-discharge type. The manufacturers, the Chain Belt Co., Milwaukee, Wis., claims that it requires 20 per cent less power for operation than any other mixer, as gears are entirely eliminated in its construction. A steel roller-chain belt, with case-hardened steel pins and bushings, is used throughout for driving purposes. As it takes from 100 to 150 pounds of coal, per 10-hour day, to generate a horsepower in a small upright boiler the importance of a smooth running device merits careful consideration. The drum is made of a special mixture of semi-steel, very hard, tough and durable. All the corners are rounded and so shaped as to project the material toward the center. The discharge end is enlarged to facilitate the elevating buckets in the rapid and complete delivery of the material onto the discharge chute. The frame is constructed entirely of heavy steel channels and angles well braced and riveted together.

Seventy per cent of all chain-belt mixers ordered last year were equipped with the power loader, which is claimed to save about half the labor of mixing. The loader is charged on the ground level directly from wheelbarrows, thus eliminating platforms and runways. The loader is filled while the previous batch is being mixed and as soon as this batch is discharged the loader is elevated, a batch emptied in the drum, and the loader returned to the ground ready for another charge, the entire operation consuming less than 10 seconds. The frame carrying the power loader is short and wide, supported entirely by the machine, not decreasing its portability. The loader is raised and lowered by means of a single wire cable atached to a simple friction hoist. The operation of the



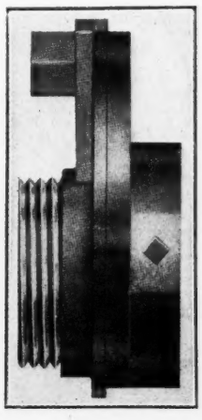
CHAIN-BELT MIXER WITH LOADING DEVICE.

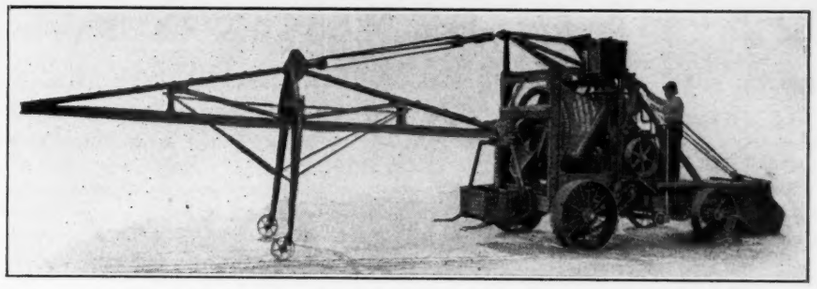
hoisting drum is controlled by two levers; one engaging the friction clutch when the loader is elevated, the other operating the brake when the loader is lowered. The cable operates through one double and two single grooved sheaves which are supplied with housings, case-hardened steel bushings, and compression grease cups. As the cable is attached to the middle of the tail shaft the pull is always even, and owing to the arrangement of the sheaves little power is required. The manufacturers call special attention to the substantial manner in which the cable is connected to the loader and the loader pivoted to the mixer frame. The tail shaft is connected by malleable iron connecting rods to heavy Y-shaped trunnions, which are designed to distribute the strain evenly over the sides of the loader. The discharge end of the loader is pivoted very close to the drum so that no auxiliary hopper is required. The pivot shaft is keyed to a malleable iron saddle which is firmly riveted to the loader, and the shaft turns in heavy boxes which are bolted to the frame.

Cut-Off Hydrant Valve

THE object of the Seagrave crescent cut-off valve for fire hydrants is to provide a quick means for turning on and off the water. Their use will avoid delay in case two or more engines arrive successively at a hydrant to which they desire to attach. Suppose the first engine already has water. Before the second can be brought into action 18 turns of the wrench on the valve stem at the top of an ordinary hydrant are necessary to turn off water. Then after the second engine has been attached 18 turns more are necessary in order to turn the water on again. In the meantime the first engine is out of action and the fire is gaining headway. This is not an uncommon occurrence.

The Seagrave Crescent Cut-off Valve is made up of two disks—one stationary, the other revolving concentrically upon it. Each disk is provided with a threaded port; the port of the stationary disk being threaded for connection with the existing nipples on the hydrants already in use, and the port of the revolving disk being threaded for connection to the hose coupling. These ports being of less diameter than the radius of the disks, a half turn of the outer or revolving disk entirely cuts off the flow of water; a half turn in the opposite direction brings the openings opposite each other so that there is no restriction to the flow of water from the hydrant, the valve opening being the full area of the hydrant opening. As the valve consists of one disk revolving upon another disk, there remains no space where water can accumulate and freeze. When the Seagrave Crescent Cut-off Valve is applied to hydrants already in use it extends less than two inches beyond the brass nipples of the hydrant. It is manufactured by the John Simmons Company, 110 Center street, New York, N. Y. The cut-off valve is very useful during the street sprinkling season, and stands pressures up to 500 pounds to the square inch.

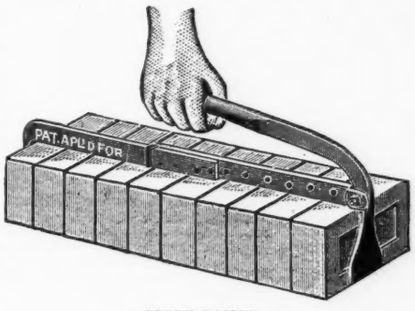




AUSTIN CONCRETE MIXER FOR PAVING FOUNDATIONS

Filler and Stretcher Brick

THE Nelsonville Brick Company, The Ruggery, Columbus, O., manufactures a patented filler and stretcher brick designed for use along street railway tracks. During the years 1906 and 1907 185 miles of track were laid with these special brick; during 1908, 115 miles. The filler brick fills the entire web of rails and obviates the need for any other kind of filler material. The flanges of car wheels find ample accommodation within the groove formed by the filler brick and the rail side. The stretcher brick completes the required depth of groove for the wheel flange and forms a substitute for grooved rails. Both brick are made nine inches long.



BRICK TONGS

Cube Concrete Mixer

THE Austin Cube Mixer is designed not to bring out entirely new principles, but to simplify and strengthen a type that has successfully stood the test of service. It is a square steel box with two diagonally opposite corners cut off very short. To these two corners are firmly riveted heavy cast-iron ends with openings through which the materials are charged at one end and discharged at the other. There is a heavy chilled track cast on the face of each of these ends, which revolves on four chilled roller bearings and supports the cube. The cube is revolved by means of a heavy spur gear bolted to the discharge end, which meshes into a spur pinion on the driving shaft. A complete discharge of the batch is obtained by means of a patented rotary discharge chute, which is attached to a central shaft and is rocked over to a horizontal position inside the cube when mixing. To discharge the batch the lever is rocked over with one hand until the chute is in a vertical position, when three large discharge vanes deposit the concrete on the chute down which it slides into wheelbarrows, buckets or carts. There are no small blades inside the mixer to do the mixing. The three discharge vanes which are so large that there is no tendency for the cement to clog, constitute the entire mechanism. The manufacturers claim that the grinding and kneading action of a cubical shaped mixing drum is the only process that positively grinds away the film of fine dust on the surface of crushed stone or the coating of loam from gravel, thereby insuring absolute contact of cement and stone.

The mixer shown above is designed for mixing and spreading concrete on the street for pavement foundations. It consists of an Austin Cube Mixer mounted on wheels to discharge from the rear. It has a spreading boom which is pivoted to swing both ways across the street. The spreading bucket is specially designed for the purpose, and delivers the concrete in place in such a way that but little leveling is required. The truck wheels are 12 inches wide at the rear and 8 inches wide in front, and the machine will travel over rolled grades without injuring them. A special loading hopper permits the materials being charged to the mixer at the ground level, eliminating all elevating by manual labor. It is made by the Austin Cube Mixer Co., 644 Railway Exchange, Chicago.

Brick Clamp

THE Langner Manufacturing Company, 950 East Sixty-seventh street, Cleveland, O., manufactures the Cleveland Brick Clamp for the use of contractors for brick paving and for other purposes. The device is simple, as shown in the cut. The manufacturers claim that the clamp will pay for itself in three days by handling brick over the old method: by saving 25 per cent time unloading a car of brick; by not making a mistake in the count, as they can be adjusted from four paving brick to 12 regular; by saving from 50 cents to $1 on every thousand pressed brick by not chipping. Pavers save 33 per cent by carrying bricks from curb to paver instead of wheeling them.

SPECIAL BRICK FOR T-RAILS

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we can not guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

State	City	Received Until	Nature of Work	Address Inquiries to
STREET IMPROVEMENTS				
Ohio	Toledo	Mar. 4	Grading, draining, macadamizing road, 2 twps	C. J. Sanzenbacher, Co. Auditor.
Georgia	Clarksville	Mar. 4	Grading and laying 3 miles Chattahooche brick or concrete walk.	J. H. Hicks, Mayor.
Ohio	Cincinnati	Mar. 4, noon	Improving Nelson road, Symmes twp.; Spec. No. 983	Fred Dreihs, Clk. Co. Comrs.
Pennsylvania	Gallitzin	Mar. 5	Furn. 450,000 paving block; also paving with brick 9,000 sq. yards	Harry F. Conrad, Boro. Secretary.
Wisconsin	Racine	Mar. 5	Brick paving on concrete, Racine st., 11th st. to city line	P. H. Connolly, Chm. Bd. Pub. Wks.
Florida	Palatka	Mar. 5, 11 a.m.	Building 3 sections hard-surfaced roads: 12, 12 and 4 miles long.	R. F. Ensey, County Engineer.
Ohio	Ashland	Mar. 5	Macadamizing 3 3-4 miles road, inc. 23,900 cu. yds. excav., 22,015 sq. yds. gravel macadam roadway; T. Brindle, Engr.	Clerk Bd. Trus., Clearcreek Twp.
Massachusetts	Springfield	Mar. 5, noon	Furn. sidewalk, cross walk, cement, pipe, brick, etc.	A. A. Adams, Supt. Sts. and Sewers.
Minnesota	St. Paul	Mar. 7	Macadamizing 3 avenues; grading 2 avenues	E. G. Krahmer, County Auditor.
Indiana	Crown Point	Mar. 7	Bldg. 3 roads in Calumet and one in Cedar Creek twp.	Chas. A. Johnson, County Auditor
Iowa	Grinnell	Mar. 7	Bldg. cement and brick sidewalks during 1910	L. D. Kemmerer, Mayor.
New York	Port Jervis	Mar. 7, 8 p.m.	Macadamizing, grading, etc., Putnam ave.; cost, $30,000	E. V. Brophy, Village President.
New Jersey	Plainfield	Mar. 7, 8 p.m.	Furn. curbing, crosswalks, culverts, crushed stone, etc	Jas. T. MacMurray, City Clerk.
Nebraska	Omaha	Mar. 7, 11 a.m.	Brick paving, gutters, retaining wall, etc., at Omaha depot	Capt. S. H. Ford, Q.M., U. S. Army.
Illinois	Carmi	Mar. 7	Brick paving, various streets	Board of Local Improvements.
Indiana	Columbus	Mar. 7, 10 a.m.	Constructing 2.10 miles macadam road, Hawcreek twp.	John M. Davis, County Auditor.
Indiana	Greensburg	Mar. 7, 1 p.m.	Bldg. 1 1-2 miles macadam road, Clay twp.	Frank E. Ryan, County Auditor.
Indiana	Washington	Mar. 7, 2 p.m.	Constructing Beckett gravel road	Thomas Nugent, County Auditor.
Indiana	Logansport	Mar. 7, 2 p.m.	Bldg. Chas. E. McCoy and other roads in Miami twp	Geo. W. Cann, County Auditor.
Indiana	Tipton	Mar. 7, 10 a.m.	Bldg. 6 stone and gravel roads, 17,200 ft. long	J. F. Barlow, County Auditor.
Indiana	Marion	Mar. 7, 2 p.m.	Brick paving; bldg. 5,310 ft. stone road, Lib. twp	A. Y. Stout, County Auditor.
North Dakota	Grand Forks	Mar. 7, 5 p.m.	Paving, to cost $300,000: Ray E. Wickham, Engr.	W. H. Alexander, City Auditor
Alabama	Montgomery	Mar. 7, noon	Paving, any hard material, storm sewers, curbing, etc., 5 sts.; Schillinger or hexagon block walks, curb, etc., 6 sts	Robert Tait, City Treasurer.
Alabama	Dothan	Mar. 7, 8 p.m.	Furn. and laying 14,000 sq. yds. smooth pavement; wood block, brick, bitulithic and asphalt	Joe Baker, Mayor.
Texas	Ft. Crockett	Mar. 7, 2 p.m.	Bldg. roads, walks, storm sewers; water distributing system	Capt. P. Whitworth, Const. Q. M.
North Carolina	Oxford	Mar. 7	Bldg. 20 miles County road: work to include 3,000 cu. yds. of brick, vit, pipe culverts. J. A. Osborne, County Engr.	R. W. Lassiter, Chm. County Comm.
Indiana	Hartford City	Mar. 7, noon	Bldg. 2 macadam roads, 10,525 and 14,820 ft. long	L. W. Daugherty, Co. Auditor.
Oklahoma	Oklahoma City	Mar. 7, 5 p.m.	Asphalt paving, 262,215 sq. yds.; cost, $860,000; See Feb. 16 issue	W. C. Burke, City Engineer.
Minnesota	Waseca	Mar. 8	Paving 118,916 sq. ft., curbing, 7,428 lin. ft.	John Madigan, City Clerk.
Indiana	Crawfordsville	Mar. 8	Bldg. Otis Thompson et al. roads, Madison twp.	Luther R. Long, Chm. Co. Comrs.
Indiana	Vincennes	Mar. 8, 2 p.m.	Bldg. 4 gravel roads, Busseron twp., 15,660 ft. long	J. T. Scott, County Auditor.
Pennsylvania	McKeesport	Mar. 8, 4 p.m.	Improving Walnut st.; brick paving, curb, etc., Beaver st.	C. E. Soles, City Controller.
Pennsylvania	Pittsburg	Mar. 8, 4 p.m.	Brick paving, Walnut st., in Versailles twp	R. J. Cunningham, County Cont'r.
Indiana	Fowler	Mar. 8, 1 p.m.	Constructing gravel and stone roads, to cost $125,000	Lemuel Shipman, Co. Auditor.
Indiana	Wabash	Mar. 8, 1:30 p.m.	Bldg. 3 miles gravel road in Lagro, 1 1-2 miles on Chester twp. line	J. P. Noftzger, County Auditor.
New York	St. George, S. I.	Mar. 8, noon	Furn. 36,000 tons broken stone and screenings in 3 stone dists	George Cromwell, Pres. Boro. Rich.
Kansas	Emporia	Mar. 8	Asphaltic concrete and brick paving	Alva J. Smith, City Engineer.
Louisiana	Leesville	Mar. 8, 4:30 p.m.	Constructing 30,000 sq. ft. concrete sidewalk and curb	J. B. Sterns, City Engineer.
Washington	Olympia	Mar. 8	Grading, curbing, bridging, macadamizing State Aid Road No. 65	H. W. Bowlby, State Hwy. Com.
Indiana	Paoli	Mar. 8	Bldg. 3 macadamized roads, total length 32,916 ft.	A. B. Ham, County Auditor.
Indiana	Peru	Mar. 9, noon	Bldg. 3 gravel roads, 15,840, 10,464 and 24,393 ft. long	Charles Griswold, County Auditor.
Indiana	Kokomo	Mar. 9, 2 p.m.	Bldg. 3 gravel roads, each about 3 miles long	Bd. Comrs. Howard County.
Indiana	Muncie	Mar. 9, 10 a.m.	Bldg. E. G. Clark brick road in Center township	Joseph E. Davis, County Auditor.
Kentucky	Louisville	Mar. 9	Laying granitoid sidewalks on Bwy. and Chestnut sts.; $17,000.	Board of Public Works.
Alabama	Ft. Morgan	Mar. 10, 1:30 p.m.	Bldg. brick roads, board walks, drains, etc., at Fort	Capt. H. B. Chamberlin, Constr. Q.M.
Wisconsin	Plymouth	Mar. 10, 8 p.m.	Paving 10,756 sq. yds.; curb and gutter, 4,549 lin. ft.	C. W. Jackson, City Clerk.
Maryland	Towson	Mar. 10	Grading and macadamizing 3-4 miles of Falls road	E Stanton Bosley, Sec'y Hwy. Com.
Minnesota	Mankato	Mar. 10, 2:30 p.m.	Brick paving, 21,045 sq. yds., 2 streets	J. R. Thompson, Pres. Bd. Pub. Wks.
Florida	Pensacola	Mar. 10, noon	Constructing 635,000 sq. ft. of concrete sidewalks	L. Earle Thornton, City Engineer.
Indiana	Brazil	Mar. 11, 11:30 a.m.	Bldg. gravel road 8,308 ft. long	James L. Burns, Co. Auditor.
Indiana	Lafayette	Mar. 12, 10 a.m.	Bldg. F. M. Buskirk et al. free gravel road	John P. Foresman, County Auditor.
Ohio	Orrville	Mar. 12, noon	Improving Mohican ave., W. Market to Terminal st.	F. E. Wolfe, Village Clerk.
Indiana	Laporte	Mar. 12, 10 a.m.	Bldg. 2 macadam roads, 5,280 and 4,917 ft. long	Charles H. Miller, County Auditor.
Wisconsin	Menasha	Mar. 14	Grading, curbing and paving	D. McMahon, Chm. St. Com.
Pennsylvania	Oil City	Mar. 14, 7:30 p.m.	Paving 29,000 sq. yds.; curbing, 16,000 lin. ft.; fill 8,800 cu. yds.; excavation, 14,600 cu. yds.; various sts.	C. W. Mullally, City Controller.
Kansas	Caney	Mar. 14	Brick paving, 13,950 sq. yds. grading, curbing, 4 sts., 2 alleys.	R. V. Dolson, City Clerk.
Alabama	Gordon	Mar. 15	Constructing 51 miles of gravel road in Houston County	W. J. Parish, County Comr.
Wisconsin	Burlington	Mar. 15, 2 p.m.	Brick paving 10,321 sq. yds. on 6-in. concrete base; 2,500 lin. ft. cement curb; 2,600 cu. yds. excavation	P. J. Hurtgen, City Engineer.
Ohio	Sylvania	Mar. 15, noon	Vit. brick or block paving, etc., Ohio ave. and Division st.	W. B. Harris, Village Clerk.
Oklahoma	Clinton	Mar. 15, 8 p.m.	Vit. block paving, 24,505 sq. yds. on 5-in. concrete base and asphalt filler; excav. 5,880 cu. yds. earth; concrete curb, 2,480 lin. ft.; conc. gutter, 15,230 sq. ft. J. L. O'Hearn, Cons. Engr.	C. C. Smith, City Clerk.
Indiana	Ft. Wayne	Mar. 16, 2 p.m.	Grade crossing work, 3 streets; city's portion, $8,000	Frank Randall, City Engineer.
New York	Corning	Mar. 17, 11 a.m.	Bldg. 12,000 sq. yds. brick pavement with cement curb, and 8,520 sq. yds. bit. macadam, with cement curb and gutter	W. C. Sleight, Clk. Bd. Pub. Wks.
Alabama	Montgomery	Mar. 21, noon	Graveling 12 miles; grading and graveling 2 miles of road	J. T. Bullen, County Engineer.
Ohio	Canton	Mar. 22	Curbing, 12,300 lin. ft.; flagstone walks, 61,420 sq. ft.	P. H. Weber, City Engineer.
North Carolina	Raleigh	Mar. 30	Paving 25,000 sq. yds. with brick, cement filler, bitulithic and asphalt macadam on Fayette and other streets	Wm. W. Willson, City Clerk.
SEWERAGE				
Ohio	Dayton	Mar. 4	Bldg. Haynes st. storm sewer system: 4,790 ft. 12 to 24-in. pipe sewer; 1,385 ft. and 700 ft. 30-in. concrete; 16 manholes, etc.	Wm. A. Budroe, Sec'y Bd. Pub. Serv.
Kentucky	Louisville	Mar. 4, noon	Bldg. Sec. A, Castlewood sewer, Contract 61: 3,591 ft. 39 to 66-in. concrete sewer; 930 ft. 20-in. vit. pipe; 4,521 ft. earth and 1,500 cu. yds. rock excav.: av. cut, 11.8 ft.; 1,440 cu. yds. concrete; 2,760 sq. yds. brick paving	P. L. Atherton, Chm. Sewer Comn.
Virginia	Portsmouth	Mar. 4, 8 p.m.	Furn. and erect, inc. foundations, connections, etc., complete, ready for operation, mech. equipment and stack for operating sewage ejectors. J. O. Cassell, City Engineer.	A. Aug. Bilisoly, Chm. Sewer Com.
Illinois	Rockford	Mar. 4, 11 a.m.	Bldg. 3 sewers, 17,952 ft. pipe and 480-ft. cement sewer; $22,536	S. B. Hand, City Engineer.
Massachusetts	Springfield	Mar. 5, noon	Furn. sewer and well brick, vit. clay pipe, castings, etc.	A. A. Adams, Supt. Sts. and Sewers.
Illinois	Metropolis	Mar. 7, 2 p.m.	Bldg. $63,000 sewer system. Municipal Eng. Co., Woodner building, Peoria	Sec'y Bd. Local Improvements.
Iowa	Grinnell	Mar. 7	Furnishing sewer pipe, etc., for 1910	W. F. Beard, City Engineer.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
SEWERAGE—Continued				
North Dakota	Grand Forks	Mar. 7, 5 p.m.	Bldg. 3 vit. pipe lateral sewers in Dist. No. 9	W. H. Alexander, City Auditor.
Oklahoma	Ft. Sill	Mar. 7, 10 a.m.	Constructing a sewerage system and a drainage system	Capt. David L. Stone, Constr. Q. M.
Texas	Ft. Crockett	Mar. 7, 2 p.m.	Bldg. storm sewers, roads, walks and water dis. system	Capt. P. Whitworth, Q. M.
Ontario	Orillia	Mar. 7, 8 p.m.	Sewerage pumping machinery, inc. gaso. engine, electric motors and centrifugal pumps; Willis Chipman, C.E., Toronto	C. E. Grant, Town Clerk.
Massachusetts	Lynn	Mar. 8, 8 p.m.	Furn. No. 1 Akron sewer pipe and fittings in carload lots, castings, D grates and frames, manholes, rings and covers; Clapp grates and square grates during 1910	C. H. Ramsdell, Chm. Bd. Pub. Wks.
Pennsylvania	Glenosborne	Mar. 10, noon	Bldg. 6,145 ft. 8 and 10-in. san. sewer, 18 manholes, 1 flush tank	L. E. Chopin, C.E., Frick Bldg., P'gh.
Indiana	Richmond	Mar. 10	Constructing sewers for city	H. M. Hammond, Chm. Bd. Pub. Wks.
Michigan	Ludington	Mar. 10, 2 p.m.	Constructing sewers in various streets	Fred Gallie, City Clerk.
Wisconsin	Plymouth	Mar. 10, 8 p.m.	Bldg. 9,426 ft. 6-in., 13,783 ft. 8-in., 630 ft. 10-in. vit. pipe sewer; 410 ft. 4-in. force main, 84 ft. 8-in. c. i. pipe for river crossing; 49 manholes, 28 lamp holes, 1 elec. pump station	C. W. Jackson, City Clerk.
Oklahoma	Clinton	Mar. 15, 8 p.m.	Bldg. 1,200 ft. 18-in., 4,970 ft. 15-in., 1,520 ft. 12-in., 10,900 ft. 10-in., 7,000 ft. 8-in. sewers of first quality pipe, manholes, etc.	G. G. Welch, Mayor.
Wisconsin	Burlington	Mar. 15, 2 p.m.	Bldg. (*a*) sanitary sewers; (*b*) storm sewers: (*a*) 1,861 ft. 10-in.; 1,073 ft. 8-in; 560 ft. 6-in. vit. pipe, 8 manholes, 2 lamp holes; (*b*) 716 ft. 12-in., 360 ft. 10-in., 300 ft. 8-in. vit. pipe sewer, 5 manholes, 12 street inlets	P. J. Hurtgen, City Engineer.
Florida	Madison	Mar. 16, 8 p.m.	Bldg. sanitary sewer system: 6 miles 6 to 15-in. pipe sewer and disposal plant, complete; H. S. Jaudon, C.E., Savannah, Ga	R. H. Rowe, Mayor.
New York	Monticello	Mar. 17, 8:30 p.m.	Bldg. portion of sewer system and disposal plant	Dr. R. W. Allan, Sec'y Sewer Comrs.
Virginia	Williamsburg	Mar. 23, noon	Frame house for sewerage and water, electric light and power systems for city	John L. Mercer, Chm. Wtr. Com.
Tennessee	Cleveland	April 1	Bldg. $35,000 sewer system and disposal plant for city	Sol.-Norcross Co., Atlanta, Ga., Engr.
New York	Syracuse	April 1	Harbor Brook improvement, 3 miles long, including constructing of intercepting sewer	Intercepting Sewer Board.
North Dakota	Ashley	April 4, 2 p.m.	Furnishing 12 metal culverts of various sizes	John F. George, County Auditor.
WATER SUPPLY				
Ohio	Toledo	Mar. 4	Furn. f. o. b. cars Toledo 1,000 tons 4, 6, 8, 10 and 30-in. c. i. pipe	Director of Public Service.
California	Los Angeles	Mar. 7	Furnishing water meters	Board of Water Commissioners.
Texas	Midland	Mar. 7	Bldg. $50,000 water works; O'Neil Eng. Co., Dallas, Engrs	H. B. Dunagan, City Secretary.
Mississippi	Vicksburg	Mar. 7	Laying 50 blocks of water mains in 4 streets	C. R. Twiss, City Engineer.
Pennsylvania	Meadville	Mar. 7, noon	Bldg. brick or concrete chimney at pumping station	H. Ellsworth, Sec'y Wtr. & Lt. Dept
Alabama	Ft. Morgan	Mar. 7, 1:30 p.m.	Bldg. 3 rein. concrete cisterns, one 30,000 and two 8,500 gals. capacity	Capt. H. B. Chamberlain, Q. M.
Texas	Ft. Crockett	Mar. 7, 2 p.m.	Water distributing system, storm sewers, paving roads, etc.	Capt. P. Whitworth, Constr. Q. M.
Oklahoma	Ft. Sill	Mar. 7, 10 a.m.	Water distributing system, sewer system, drain system	Capt. David L. Stone, Constr. Q. M.
Illinois	Rock Island	Mar. 7, 5 p.m.	Holly pump, now at pumping station, 3,000,000-gal. capacity in 24 hrs.; estimated weight, 75 tons	M. T. Rudgren, City Clerk.
Oregon	Portland	Mar. 8, 4 p.m.	Material and labor for bldg. steel conduit from headworks of Mt. Tabor, parallel with present Bull Run conduit, 24 miles long, inc. 52,915 ft. 52-in. and 75,379 ft. 44-in. steel pipe, in place; complete in 18 mos.; D. D. Clarke, Engr.	Frank T. Dodge, Supt. Water Bd.
Kansas	Ft. Riley	Mar. 8, 10 a.m.	Bldg. boiler house and pump pit and furn. and install. boiler, pumping engine and water mains at post	Capt. W. M. Whitman, Q. M.
New York	New York	Mar. 8, 11 a.m.	Furn. and deliver eight 3 x 8 ft. twin sluice gates, eight 20-in. hand-operated gate valves, twenty 60-in. gate valves, etc.	J. A. Bensel, Pres. Bd. Wtr. Sup.
Oklahoma	Ft. Reno	Mar. 14, 1 p.m.	Bldg. steel tank and tower, 11 concrete cisterns, boring 12 wells	Capt. L. Hardeman, Depot Q. M.
Arizona	Phoenix	Mar. 14, 4 p.m.	Furnishing 5,000,000-gal. pumping engine	Robt. A. Craig, Supt. Water Works.
Wisconsin	Burlington	Mar. 15, 2 p.m.	Furn. and lay. 1,334 ft. 4-in. water pipe, four 4-in. gates and valve boxes, one 6-in. gate, etc., one hydrant, 2 reset	P. J. Hurtgen, City Engineer.
Indiana	Ft. Wayne	Mar. 15, 3 p.m.	Furnishing 3,000 to 9,000 water meters; 3 different kinds to be purchased at cost of $50,000; mostly 5-8-inch size	Board of Public Works.
Kansas	Columbus	Mar. 21, noon	Furn. all materials for water works: 3,200 ft. 6-in., 7,400 ft. 4-in., two 6-in. and four 4-in. valves and boxes; 16 hydrants, specials, etc	F. H. Hawkins, City Clerk.
South Dakota	Faulkton	Mar. 21	Furn. material and bldg. 60,000-gal. steel tank on steel tower	J. T. Mitchell, City Auditor.
Virginia	Williamsburg	Mar. 23, noon	Franchise for water works, lighting and power and sewerage systems for city	John L. Mercer, Chm. Wtr. Com.
Minnesota	Minneapolis	Mar. 25	Furnishing 2,000 5-8-in. corporation cocks, complete	Henry N. Knott, City Clerk.
Pennsylvania	Lebanon	Mar. 25	29,100 ft. 20-in. gravity main and 3,700 ft. 16-in., 13,900 ft. 32-in., 3,900 ft. 10-in. main, in streets. T. R. Crowell, City Engineer	J. D. Kerr, Sec'y Wtr. & Lt. Comrs.
Pennsylvania	Lebanon	Mar. 30	Laying new pipe line from supply dams at South Mountain to city; $140,000 bonds voted. E. H. Schroff, Supt	Geo. W. Lingle, Pres. Water Board.
BRIDGES				
Florida	Jacksonville	Mar. 4	Repair of Trout Creek bridge	Board of County Commissioners.
Kansas	Leavenworth	Mar. 7, noon	Constructing several bridges	J. W. Nichaus, County Clerk.
Indiana	Cannelton	Mar. 7, 1 p.m.	Bldg. steel bridge over Oil Creek, near Derby	Board Co. Comrs. of Perry County.
Florida	Bradentown	Mar. 7	Constructing 4 steel bridges over bays, rivers and creeks	Robt. H. Roesch, Clk. Co. Comrs.
Kansas	Topeka	Mar. 7	Bldg. extension at south end Melan bridge over river	C. B. Burge, City Clerk.
North Carolina	Oxford	Mar. 7	Raising 85-ft. steel span 16 ft. higher and bldg. two 75-ft. steel spans, one on either end of present bridge	James A. Osborne, County Engr.
North Carolina	Webster	Mar. 7	Bldg. 40-ft. steel, single-span bridge at Sylva	H. R. Queen, Chm. Co. Comrs.
Manitoba	Winnipeg	Mar. 7	Bldg. overhead bridge at Brant & Brown sts.; cost, $229,646	M. Peterson, Sec'y Bd. Control.
Indiana	Brazil	Mar. 8, 11:30 a.m.	Bldg. 75-ft., also 50-ft., steel bridges on concrete sub.; also 5 concrete bridges: 334-ft. span, 2 spans of 23 1-2 ft. each; 30-ft. span, 34 and 35-ft. spans	James L. Burns, County Auditor.
Indiana	Fowler	Mar. 8, 1 p.m.	Bridges, culverts, etc., on $125,000 worth of road work	Lemuel Shipman, Co. Auditor.
Washington	Spokane	Mar. 8	Furn. all structural steel for Monroe st. bridge	Geo. W. Armstrong, Sec'y Bd. P. W.
Indiana	Bloomington	Mar. 9	Bldg. 4 bridges: 26, 28, 38 and 80-ft. spans	A. L. Donaldson, County Engineer.
Michigan	Ann Arbor	Mar. 9, 7:30 p.m.	Bldg. 2-span conc. bridge, 75 ft. each, 20-ft. roadway, 6-ft. walk	E. W. Groves, City Engineer.
Missouri	Independence	Mar. 9	Bldg. 3 steel bridges: 16, 24 and 30 ft.; 2 concrete and one masonry abutments	R. T. Procter, Highway Engineer.
Ohio	Cincinnati	Mar. 11, noon	Bldg. concrete bridge on Bogard road, Anderson twp.	Fred Dreihs, Clk. Co. Comrs.
Kansas	Hutchinson	Mar. 11, 3 p.m.	Bldg. rein. conc. arch bridge, 50-ft. span, 300 ft. long, Cow Creek	G. L. McLane, City Engineer.
Alberta	Edmonton	Mar. 12	Bldg. all steel highway bridges required for 1910	John Stocks, Dep. Min. Pub. Wks.
Georgia	Savannah	Mar. 14, noon	Bldg. steel highway bridge, inc. foundations over Herb river	G. Reuben Butler, County Clerk.
Ohio	Norwalk	Mar. 14, 10 a.m	Furn. and erect steel riveted truss bridge, 100-ft. span, 16-ft. rdwy., over Vermillion river, near Clarksfield	Jay E. Smith, County Auditor
Missouri	St. Louis	Mar. 15, noon	Rebldg. super. and bldg. new substructure, portion 18th. street bridge	M. Reber, Pres. Bd. Pub. Impts.
Nebraska	Columbus	Mar. 15	Bldg. all bridges ordered for one year from April 1	John Graf, County Clerk.
Michigan	St. Joseph	Mar. 16, noon	Bldg. substructure for swing bridge over Morr. Chan. and railroad on Wayne st.; also timber protection for draw and temporary bridge at forest	M. Weber, City Clerk.
Arizona	Phoenix	Mar. 16, 11 a.m.	Bldg. rein. concrete bridge over Salt river	Wm. E. Thomas, Clk. Bd. Superv.
Louisiana	Shreveport	Mar. 22, 5 p.m.	Bldg. $300,000 steel traffic bridge over Red river	Geo. R. Wilson, City Engineer.
North Dakota	Grand Forks	Mar. 22, 10 a.m	Bldg. all steel bridges ordered in 1910; by lin. ft. for truss and plain	Hans Anderson, County Auditor.
California	San Jose	April 5	Bldg. $15,000 rein. concrete bridge over Coyote creek	J. G. McMillan, County Surveyor.
Washington	Kalama	April 5	Bldg. 300 ft. steel hwy. bridge at Castlerock, one span with wood flooring, 16-ft. roadway; concrete sub., 2 piers, 70 ft. high, 55 ft. being above water	G. S. Roberts, County Engineer.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
LIGHTING AND POWER				
North Dakota	Grand Forks	Mar. 7	Improvements at municipal electric lighting plant	Chairman Sanness, Light Comm.
Indiana	Ft. Wayne	Mar. 7	Furn. and install 1,500 k.w. turbine and generator	Henry Zanner, Supt. Light Plant.
Ontario	Toronto	Mar. 8	Supply of underground cable	G. R. Geary, Chm. Bd. Control.
West Virginia	Wheeling	Mar. 9, 11 a.m.	Bldg. fireproof power house; installing 100 h.p. gas engines, air compressors, receivers, piping, etc., and drilling a well at Dams Nos. 8 and 11, Ohio river, entire or separate	Capt. F. W. Alstaetter, Corps Eng.
Missouri	Kansas City	Mar. 10	Furnishing machinery at Turkey creek pump station	S. J. Armstrong, Sec'y Water Bdrs.
California	Sierra Madre	Mar. 12	Gas franchise for bldg. and operating for 50 years a system of underground conduits, mains and gas pipes	J. A. Madden, Clk. Bd. Trus.
Wisconsin	Green Bay	Mar. 15	Furn. and install. electric fixtures in new Court House	Paul Schuering, County Supervisor.
Dist. of Col'bia	Washington	Mar. 15, 2 p.m.	Furn. 12x12-in. triplex single-acting power plunger pump and 20 h.p. Springfield gas engine	C. H. Rudolph, Pres. Bd. Comrs.
Virginia	Williamsburg	Mar. 23, noon	Franchise for lighting and power systems; also for sewerage and water works for city	John L. Mercer, Chm. Water Com.
California	Hayward	April 6	Purchase of electric light and power franchise	Board of City Trustees.
MISCELLANEOUS				
Dist. of Col'bia	Washington	Mar. 5, noon	Furn. 5 tool wagons, 35 chest wagons, 20 pontoon wagons	Lt.-Col. W. C. Langfitt, U. S. Engrs.
Florida	Perry	Mar. 7	Bldg. new jail and cells or addition to old structure	John C. Calhoun, Clk. Co. Comrs.
Iowa	Oskaloosa	Mar. 7, 7:30 p.m.	Sweeping, hauling dirt and refuse from paved sts.: 46,720 sq. yds. sts. twice a week, 152,695 twice per month, 11,224 sq. yds. alleys twice per month; take up sidewalk plates and cleaning gutters under them each time of sweeping; bids per 1,000 sq. yds	C. E. Munroe, City Clerk.
Indiana	Ft. Wayne	Mar. 8, 3 p.m.	Bldg. machine shop and store-room at No. 1 pump station	F. T. Benoy, Chm. Bd. Pub. Wks.
North Dakota	Williston	Mar. 8	Furnishing corrugated culverts	E. M. Atterberry, County Auditor.
Kansas	Salina	Mar. 12	Bldg. Court House; Wilmarth & Zerke, Archts., Watson bldg.	Smith George, Chm. Co. Comrs.
North Carolina	Wentworth	Mar. 14	Plans, etc., for $12,000 County jail	J. T. Holland, Clk. County Comrs.
Dist. of Col'bia	Washington	Mar. 14, 10:30 a.m.	Furnishing hose, packing, gaskets and rubber belting	Gen. Purch. Agt., Isth. Canal Comm.
Connecticut	New Haven	Mar. 14, 2 p.m.	Bldg. city supply house, stables, sheds, etc	C. W. Kelly, City Engineer.
Dist. of Col'bia	Washington	Mar. 15, 2 p.m.	Furn. comb, chemical engine and hose wagon	C. H. Rudolph, Chm. Bd. Comrs.
Minnesota	Faribault	Mar. 15	Erecting a jail; Albert Scheffel, Arch., Mankato	Board of County Commissioners.
Wisconsin	Green Bay	Mar. 15, noon	Furnishing and decorating new County Court House	Elmer S. Hall, County Clerk.
Virginia	Norfolk	Mar. 15, noon	Bldg. bulkhead or retaining wall on both sides of "The Hague"	W. T. Brooke, City Engineer.
Illinois	Salem	Mar. 15	Erecting Court House; J. W. Royer, Arch., Urbana	H. K. Stevenson, Sec'y Bldg. Comm.
Indiana	Fort Wayne	Mar. 16, 2 p.m.	Track elevation work, city's portion 3 streets; cost, $4,000	H. W. Becker, Clk. Bd. Pub. Wks.
California	Oakland	Mar. 19	Franchise for electric st. railway in Berkeley	Board of County Supervisors.
Montana	Great Falls	Mar. 21, 8 p.m.	Furn. one double 50-gal. tank, 60 h.p. auto-propelled chemical fire engine, etc., f. o. b. Great Falls	W. P. Wren, City Clerk.
Texas	Gainesville	Mar. 22	Complete maps of city and city cemetery	John W. Puckett, Mayor.
Montana	Butte	Mar. 30, 2 p.m.	Bldg. $500,000 Co. Court House; sep. bids for heating, plumbing, ventilating and elec. elevators. Link & Haire, Archts	J. H. Cronin, Chm. Bd. Co. Comrs.
North Dakota	Ashley	April 4	Furnishing 12 metal culverts of various sizes	John F. George, County Auditor.

STREET IMPROVEMENTS

Corey, Ala.—Corey Land Co. will lay 87,350 cu. ft. of combination cement curb and gutter and 13,600 ft. of lining cement curb; 46,650 sq. yds. cement sidewalks and 32,411 sq. yds. of macadam streets.—Meade & Huey, Engineers; Robert Jemison, Birmingham, President.

Chico, Cal.—City Trustees will call election on $55,000 bonds for street improvements.

Los Angeles, Cal.—Bids will soon be asked by Highway Commissioners for construction of road from this city to Basset, Pomona and Whittier; cost, $100,000.

Napa, Cal.—Board of Supervisors of Napa County is considering issuing $400,000 bonds for macadamizing roads of county.

Redding, Cal.—Board of Supervisors is considering rebuilding and repairing west side road from this city through Keswick, Copley and Corn, to Kennett.

Riverside, Cal.—County Commissioners are considering construction of road in San Timoteo Canyon.

Roseville, Cal.—Board of Trustees is considering improving of 20½ miles of roads.

San Anselmo, Cal.—City has sold $40,000 street improvement bonds.

San José, Cal.—Board of Supervisors is considering widening of Minnesota ave.

Santa Ana, Cal.—Plans are being prepared by County Surveyor for construction of road from this city to Bay City.

Stockton, Cal.—Highway Commission has approved plans for improvement of almost 100 miles of county roads; about $2,000,000 available.

Visalia, Cal.—Board of City Trustees will call election on $100,000 street paving bonds.

Denver, Colo.—No bids were received for construction of proposed road from this city to Golden; $19,000 is available.

Pueblo, Col.—Council has ordered grading of Main, Eleventh and Twelfth sts.

Trinidad, Col.—City Engineer will make estimate of cost of paving Cedar st., paving district No. 7.

New Haven, Conn.—Board of Aldermen will consider laying of concrete sidewalks in fire limits of city; cost about $100,000.

New Haven, Conn.—Plans are now under way for widening and extension of Boulevard.

Jacksonville, Fla.—Opening of Osceola st. has been ordered; cost $1,000.—W. P. Jordan, Mayor.

Jacksonville, Fla.—City Engineer has been authorized to advertise for bids for construction of tile sidewalk in Riverside Park; cost $1,000.

Pensacola, Fla.—Plans have been prepared for paving Palafox and Tarragona sts.; hardening of 12th st., cost $12,000, has been ordered.

St. Augustine, Fla.—Council has passed to third reading ordinances for grading and paving with shell St. George st.

West Palm Beach, Fla.—Bids will be received by Board of County Commissioners March 18, readvertisement, for $200,000 road improvement bonds.—F. E. Fenno, Clerk.

Dalton, Ga.—City is considering election on bonds for street improvements.

Macon, Ga.—City will soon advertise for bids for street paving, as follows: Cotton ave., 16,412.04 sq. yds.; College st., 6,417.14; Georgia ave., 5,709; 5th st., 8,899.42; Main st. 10,184.26.—C. C. Anderson, City Engineer.

Boise, Ida.—Council has decided to pave business section of the city with hard surface pavement.

Cairo, Ill.—Board of Local Improvements has ordered paving of 8th st., cost $20,117.44, and Commercial ave., $135,409.

Chicago, Ill.—Courthouse Committee of County Board is considering construction of noiseless pavement around courthouse.

Elgin, Ill.—Board of Local Improvements decided to improve N. Spring st. with mineral rubber instead of brick paving.—Carl E. Plum, City Engineer.

Freeport, Ill.—Board of Local Improvements has decided to pave Adams st. with brick.

Oaklawn, Ill.—Council will consider the paving of Cannon ave.

Peoria, Ill.—Board of Local Improvements has adopted ordinances for repaving Chestnut and Walnut Sts.; bids will be advertised for paving N. Glendale Ave. with brick.

Springfield, Ill.—Bids will be received by Board of Public Service March 2 for paving Jefferson st. with brick and asphalt fill, about 4400 sq. yd.; cost, $7,929.

Bloomington, Ind.—City Engineer Hanna has estimated cost of improving E. Second st. at $6,110.75.

Bloomington, Ind.—City considering construction of 2 miles of vitrified brick paving, with cement curb and gutter, on Kirkwood ave., Public Square and one square of diverging sts. U. S. Hanna, City Engineer.

Bluffton, Ind.—City will pave East, South, Cherry and Central Aves. this spring.

Elkhart, Ind.—Elkhart Industrial Association is urging elimination of Main st. grade crossing.

Fort Wayne, Ind.—Board of Works has ordered plans for sidewalk improvements on three streets.

Indianapolis, Ind.—Marion County Commissioners will soon ask for bids for construction of three miles of brick road in Perry Township.—Albert Sahm, County Auditor.

Madison, Ind.—Madison Safe Deposit and Trust Co. and First National Bank, city, have bought $25,000 Graham Township gravel road bonds at par.

Rockville, Ind.—County Council has appropriated $4,000 to be used in constructing curb and walk around court house square.

Vincennes, Ind.—Board of Works has decided to improve Eberwine and TeWalt aves.

Belle Plaine, Ia.—City will pave Main st.; sewers will be first laid.

Cedar Rapids, Ia.—Council has ordered brick paving on five streets.

Des Moines, Ia.—Paving of Beaver ave. is being considered.

Eldora, Ia.—Council is considering paving of portions of Marion and Washington sts. with creosoted blocks.

Hutchinson, Kan.—Bids will be received March 15, 3 p. m., for $70,000 street improvement bonds.—Ed. Metz, City Clerk.

Manhattan, Kan.—Council has voted to pave Poyntz ave. five blocks, 20,000 sq. yds.; Houston st., 11 blocks, 20,000 sq. yds.; Street Committee has been appointed to look up material and report findings to Council.—J. J. McCray, Chairman; Con M. Buck, City Engineer.

Wichita, Kan.—Council has decided to pave South Lawrence ave. with bitulithic.

Catlettsburg, Ky.—City issued $12,000 of bonds for street paving.—J. J. Montague, Mayor.

Lake Charles, La.—Council has instructed City Engineer to prepare plans and specifications for sidewalk construction; length, about 5 miles.

Annapolis, Md.—Citizens of Second District have appealed to Anne Arundel County Commissioners to improve road leading from Weems Creek bridge to Wellsview Church.

Bel Air, Md.—State Roads Commission will build 6.27 miles of permanent road in Harford County this year.

Calvert, Md.—State Roads Commission will build 6.22 miles of permanent road between Calvert and Fair Hill.

Cumberland, Md.—Frostburg Council has decided to have bill presented to Legislature empowering Council to issue $50,000 bonds for street improvement.

Easton, Md.—Easton Street Improvement Commission, U. G. Ross, Chairman, will take charge of paving four principal business streets; $35,000 bonds will be issued.

Elkton, Md.—State Good Roads Commission will consider improvement of Elkton-Chesapeake rd.

Frostburg, Md.—Citizens will vote on

$50,000 bonds for grading and paving streets.

Boston, Mass.—Councilman Brand has presented order calling upon Finance Committee to include in first appropriation bill provision for $260,000 for widening Norfolk st.

Falmouth, Mass.—Town has voted to stone portion of mill road; cost $1,000.

Lynn, Mass.—Board of Works has recommended $45,000 bond issue for street improvements, including purchase of road roller and digging macadam.

Malden, Mass.—Street and Water Commissioner has asked for $10,000 for new streets and $5,000 for brick sidewalks and edgestones.

Marion, Mass.—Town will vote on macadamizing of Pitcher and Clark sts. and continuance of macadam on three roads.

Detroit, Mich.—Council has directed Department of Public Works to advertise for proposals for paving the following streets: Fort st., 46 ft. wide, with brick, cost $13,-169; Howard st., brick, 26 ft., $6,460; Fort st., 46 ft., brick, $15,600; Cary ave., 26 ft., cedar blocks, $4,102; Woodbridge st., 26 ft., cedar blocks, $10,067; Magnolia st., 26 ft., cedar blocks, $14,982; Frederick Ave., 26 ft., cedar blocks, $18,260; McDougall Ave., 32 ft., cedar, $6,600; 23d st., 26 ft., cedar, $4,-224; Illinois st., 26 ft., cedar, $16,610; Leland st., 26 ft., cedar, $2,420; all to be on concrete foundation, with Medina, Berea or other approved curbings.—J. J. Haarer, 104 City Hall, Commissioner.

Grand Rapids, Mich.—City Engineer Anderson has made approximate estimates for paving contemplated: Grading and graveling Neland ave., $9,620; grading and paving 5th ave., with asphalt or bituminous macadam, $14,510; grading and paving Bemis Court with asphalt macadam or bituminous macadam, $2,160; grading and graveling 4th st., $24,450; same with bituminous poured macadam, $5,980; grading and paving 5th ave. with brick on concrete base, $14,550; grading and graveling Winsor ave., $10,180; grading and paving Livingston alley with brick on concrete base, $2,610; grading and macadamizing 4th st., $17,750; paving with bituminous macadam same, $17,670; grading and graveling same, $12,230.

Kalamazoo, Mich.—County Board has appropriated $50,000 for building of 32 miles of county roads.

Sault Ste Marie, Mich.—Chippewa County will sell $100,000 bonds for construction of roads.—H. L. Parsible, Clerk.

Duluth, Minn.—Bids will be received early in spring for about 30,363 sq. yds. sandstone paving and 12,640 ft. curbing on Garfield blvd.; cost about $107,000; also for about 1¼ miles grading on 6th st.; cost $50,000.—R. Murchison, Clerk Board of Public Works.

Island Lake, Minn.—County Commissioners have decided to build road between this city and Floodwood Station; length, 3½ miles.

Kathio, Minn.—Town has voted $12,000 bonds for roads and bridges.

Waseca, Minn.—City will pave 14 blocks with brick.

McComb City, Miss.—Pike County Board of Supervisors has selected Xavier A. Kramer, Magnolia, as County Engineer; County will construct few miles of sand-clay road at once as experiment.

Magnolia, Miss.—Board of Supervisors are considering building model country road of 5 or 10 miles, using county convicts.

Excelsior Springs, Mo.—Council has instructed Assistant City Engineer McClanahan to establish grades and prepare rough estimates for the paving of Horseshoe Bend and three other avenues.

Kansas City, Mo.—Citizens will vote April 5 on $50,000 bonds for paving repair plant.

Kansas City, Mo.—County Court has ordered grading of two more county roads; also grading and macadamizing of Holmes st.; cost $27,000.

St. Joseph, Mo.—Plan for boulevard connecting city, Krug Park and the water works, has been drawn under direction of W. E. Bowen, and will be presented to an expert landscape architect, as well as to Park Board for consideration.

Kalispell, Mont.—County Commissioners will consider macadam road from this city to Flathead Lake.

Omaha, Neb.—Council is considering paving of Underwood ave. with chert and slag.

Omaha, Neb.—Cost of paving S. 13th st. has been estimated at $59,529.

Bayonne, N. J.—Council has passed ordinance for improvement of Margaret st.—J. J. Cain, Mayor.

Long Branch, N. J.—Council has passed resolution directing Street Committee to put Long Branch ave. in condition.

Ocean City, N. J.—Street Committee has been instructed to prepare plans and specifications and ask for bids for removal and reconstruction of Boardwalk from 13th to 17th st., and building of walk from its present terminus to 17th st.

Paterson, N. J.—County Engineer will examine dangerous places on Pompton rd., between Belmont ave. and the Hamburg turnpike, and prepare an estimate of necessary repairs.

Trenton, N. J.—State Road Commissioner Gilkyson has approved of survey to be made by Board of Freeholders of Monmouth County for continuation of road leading from Trenton through Allentown to Davis Station, and Ocean County is to build remaining one-half mile from Davis Station to New Egypt.

Albany, N. Y.—Erie County Board of Supervisors has asked State Highway Commission for improvement of following roads: Tonawanda Creek, 1.77 miles; Wales Center, 6.13 miles; Akron-Tonawanda Creek, 10 miles; Broadway-Depew, 3.52 miles; Broadway Village (sic), 1.75 miles.—G. C. Diehl, County Engineer.

Binghamton, N. Y.—Citizens will vote March 11 on $25,000 bonds for pavement construction.

Binghamton, N. Y.—Town Superintendents of Highways, Broome County, are considering practicability of steam road rollers and traction engines.—Chas. Van Amburg, County Superintendent of Highways.

Buffalo, N. Y.—Council is considering repaving of 12 streets.

Canastota, N. Y.—Improvement of Peterboro st. is being considered.

Hoosick Falls, N. Y.—Village Engineer will prepare estimates on cost of paving Abbott and Church sts. and Parsons ave.

Horseheads, N. Y.—Village Trustees have adopted resolution for laying out new street.

Jamestown, N. Y.—Council has adopted resolution providing for paving Taylor st.

Matteawan, N. Y.—Village will sell $30,-000 paving bonds at once.—B. I. D. Rosa, Village Clerk.

New Hartford, N. Y.—Village has sold $3,900 paving bonds to First National Bank of Oriskany Falls.

Utica, N. Y.—Committee on Paving is considering 24 paving resolutions.

Greensboro, N. C.—Davie st. residents are urging paving on that thoroughfare with bitulithic brick.

Wadesboro, N. C.—Board of County Commissioners is considering grading and paving road leading to Seaboard Air Line depot.

Whiteville, N. C.—Citizens have voted $25,000 bonds for street improvements.—W. R. Davis, Mayor.

Wilmington, N. C.—Citizens of Federal Point Township are urging improvement of public roads in township.

Ashtabula, O.—City is considering paving of N. Main and Lake sts. this year.

Dayton, O.—City Engineer Cellarius will prepare plans for paving three streets and grading three others.

Defiance, O.—Property owners of East 2d st. and Ottawa ave., East Defiance, have petitioned Council for paving of two streets.

Hamilton, O.—County Commissioners are considering construction of county road for distance of 300 rods.

Massillon, O.—Board of Quadrennial Appraisers will lend its influence toward causing Council to appropriate sufficient money to have entire city replatted.

Oakwood, O.—Macadamizing of pike leading into city is being urged.—Kenneth Allen, City Engineer.

Sandusky, O.—Board of Public Service will soon receive bids for 22,000 sq. yds. of paving on two streets.—John Bing, Director.

Clinton, Okla.—Bids will be received March 15, 8 P. M., for construction of 2,460 lin. ft. of concrete curb, 15,230 sq. ft. concrete gutter, 24,505 sq. yds. of vitrified block paving with 5-in. concrete base and asphalt filler, and excavating 5,880 cu. yds. of earth.—J. L. O'Hearn, Consulting Civil Engineer; C. C. Smith, City Clerk.

Durant, Okla.—Plans will be prepared by City Engineer for improving portion of Mississippi st.

Holdenville, Okla.—City Engineer is preparing plans for paving 18 blocks.

Portland, Ore.—E. H. Bennett, Engineer, Chicago, will confer with Improvement League; $21,000 is available for survey and platting of city.

Portland, Ore.—Woodstock residents have voted to start immediate proceedings to improve all streets in that district; improvements will consist of grading streets and constructing concrete curbs and sidewalks.

New Castle, Pa.—City Engineer Milholland has estimated the cost of repaving Pittsburg st., and changing the grade, at $5,000.

Scranton, Pa.—City will let contracts before March 15 for paving Luzerne st.—C. V. Terwilliger, Director of Public Works.

York, Pa.—Council is considering paving of portions of five streets.

Greenville, S. C.—City is considering election on $200,000 bonds for improvements to streets and sidewalks and for building of Main st. bridge.—A. E. Sussex, City Clerk.

Chattanooga, Tenn.—Board of Aldermen has decided to establish four paving districts.

Columbia, Tenn.—City is considering paving of streets; cost about $5,000.

Pulaski, Tenn.—Giles County Court has ordered election in August on $100,000 bonds for road construction.

Amarillo, Tex.—Citizens will vote March 23 on $75,000 street improvement bond issue.

Bay City, Tex.—Commissioner's Court has ordered shelling of Bay City-Matagorda road.

El Paso, Tex.—Mayor Sweeney has requested City Engineer Todd to prepare list of streets in Paving District No. 1 not paved, including five other streets; bids have been asked for paving Magoffin ave.

Gonzales, Tex.—Citizens will vote March 29 on $15,000 bonds to improve principal streets and connect gravel roads built by county; materials to be mainly stone and gravel.

Houston, Tex.—Improvement of Harrisburg road is being urged.

Houston, Tex.—Taxpayers heve rejected plan of securing paving offered by Senate bill No. 39, as enacted into law by the Thirty-first Legislature.

Pecos, Tex.—City Council has decided upon having system of grades established for entire city; H. E. Steinman, Engineer, has been engaged to make surveys and M. L. Swinehart will act as Consulting Engineer.

San Antonio, Tex.—Finance Committee will consider $25,000 appropriation for construction of concrete sidewalks.

Big Stone Gap, Va.—Citizens have voted $14,000 bonds for street improvements, sewers and bridge over Powell River.

Farmville, Va.—Board of Supervisors is urging construction of $10,000 more of State roads.

Lynchburg, Va.—City has decided to pave Main st.; cost $15,000.

Norfolk, Va.—City has $12,000 available for relaying Belgian block to be taken from Granby st.

Waynesboro, Va.—Citizens will vote March 15 on extending sidewalks and improving Main st. and Wayne ave.; cost $7,500.

Winchester, Va.—Valley Turnpike Co. desires binding macadam for loose rock.—H. F. Byrd, President.

Bellingham, Wash. — City will pave Chestnut st. with block; cost, $40,000.

Ellensburg, Wash.—City Engineer G. N. Miller is preparing grades and estimates of cost of proposed paving.

Everett, Wash.—Improvement of Riverside streets is being urged.

Hoquiam, Wash.—Bonding of county for $225,000 to build four roads is being considered.

Montesano, Wash.—County Commissioners have voted $225,000 for construction of three roads and erection of a bridge across the Chehalis River.

Tacoma, Wash.—Council is considering improvement of South I Strand, 6th ave.

Jefferson, Wis.—Common Council has authorized construction of six blocks of brick pavement and sewer district No. 3; cost, $25,000.

Plymouth, Wis.—Bids will be received March 10, 8 p. m., for paving 10,756 sq. yds. on three streets and laying 4,549 lin. ft. of curb and gutter and 165 lin. ft. of plain curb; bids will be received on following plans: (1) Blome granitoid concrete pavement; (2) reinforced concrete pavement; (3) tar or asphalt macadam, including such patented pavements as bitulithic and (4) vit. paving brick.—W. G. Kirchoffer, 31 Vroman Bldg., Madison, Engineer; G. W. Jackson, City Clerk.

Racine, Wis.—Board of Public Works has adopted resolutions for paving wtih creosote blocks Lake and Park aves.—P. H. Connolly, City Engineer.

West Allis, Wis.—Council will issue $25,-000 street improvement bonds.

CONTRACTS AWARDED

Huntsville, Ala.—Eustis and Clinton sts., to Metropolitan Construction Co., City.

Marianna, Ark.—Street paving, to W. R. Pettey, Pine Bluff.

Denver, Col.—Surfacing streets in District No. 4, to J. Fred Roberts, $29,085.

Denver, Col.—Asphalt plant, to Hetherington & Berner, Indianapolis, Ind., $30,000.

Lewiston, Ida.—Paving Main st., to Warren Construction Co., $42,465; curbs and gutters, to Enoch & Morrey, $10,525.

New Windsor, Md.—Grading and macadamizing about 1 mile of road between New Windsor and Uniontown, to David E. Walsh, Westminster, $14,778.

Gloucester, Mass.—3,000 ft. of edgestones, to J. W. Rice, 37c. per lin. ft.

Mt. Pleasant, Mich.—Paving with brick portions of Broadway and Main st., to W.

W. Hatch & Sons, Buhl Blk., Detroit, about $25,000.

Jefferson Barrack, Mo.—Roads, walks, etc., to Ruprecht Volnal Construction Co., 8011 S. Broadway, St. Louis, Mo., $4,673.

Albany, N. Y.—Road No. 5009, Pawling Village, Dutchess County, 1.50 miles, to H. F. Burgard Co., Buffalo, $20,874; Road No. 5,010, Slingerlands-New Scotland, Albany County, two miles, to Thomas F. Shaughnessey, city, $22,400; Road No. 5,012, Fleming-Auburn, Cayuga County, 2.75 miles, to J. G. Hayes & Co., Big Run, Pa., $35,040; Road No. 5,014, Chittenango-Oneida, part 1, Madison County, 3.15 miles, to James Anderson, New Haven, N. Y., $43,300; Road No. 5,016, Camillus-Fairmount, Onondaga County, 3.09 miles, to John H. Weidman, Syracuse, $30,000; Road No. 5,017, Clyde-Savannah, part 2, Wayne County, 3 miles, to M. F. Dollard, Albany, $37,033; Road No. 5,018, Reading-Dundee, part 1, Yates County, 2 miles, to Monroe Roads Co., Pittsford, $26,058; Road No. 5,019, Lake Shore-Lackawanna City, Erie County, 1.89 miles, to Hagaman, Miller & Hagaman, Rochester, $36,163; Road No. 5,020, East Pembroke-Pembroke, Genessee County, 3.46 miles, to F. J. Mumm, Buffalo, $39,774; Road No. 5,021, Leroy-Caledonia-Mumford, Livingston County, 3.98 miles, to James Anderson, New Haven, N. Y., $45,830; Road No. 5,025, Albion-Holley, Orleans County, 2.46 miles, to Thomas Hucknalt, Albion, $24,000; Road No. 5,024, Leroy-Warsaw, Wyoming County, 2.67 miles, to Thomas Murray, Leroy, $33,000; Road No. 5,022, Binghamton-Windsor, part 2, Broome County, 3 miles, to Creden & Pitou, New York, $41,890; Road No. 5,026, Corning-Painted Post, Steuben County, 3.56 miles, to F. D. C. Vardell, Buffalo, $48,500; Road No. 5,034, Oneida Castle Village-Vernon Village, Oneida County, 1.5 miles, to M. F. Dollard, city, $16,632, and Road No. 5,035, Monticello-Liberty, part 1, Sullivan County, 2.05 miles, to Degraff & Hogeboon, Bloomington, $32,989.

Athens, O.—Paving Mill st. with brick, bids opened Feb. 7, to Mills & Miller, Millfield, $10,099.

Hamilton, O.—Paving Hamilton and Millville rd., to A. Wirtz Transfer Co. and John H. Trunck, city; $15,000, using water bound macadam.

Alva, Okla.—Improvements to Barnes ave., cost $50,457.20, to G. A. Heman, Chickasha.

Ardmore, Okla.—Street paving, to J. S. Downard, city, $1.85 sq. yd.

Norman, Okla.—Paving with asphalt a portion of Main st., to Parker Washington Co., St. Louis, Mo., $1.99 per sq. yd.

Oklahoma City, Okla.—Grading of first 12 miles of 26-mile boulevard system, to T. R. Davis, low bidder, $6,100.

Austin, Tex.—Paving E. 6th st., to Nox Johnson and C. Burland, City, $2.15 per sq. yd.

Dallas, Tex.—Grading Virginia ave., to Innes Gano, 33c. per cu. yd.; Hood st., to same, 24c. per cu. yd.

El Paso, Tex.—10,602 sq. yds. bitulithic on S. Stanton st., to Texas Bitulithic Co., city.

Galveston, Tex.—1,000 cu. yds. of mudshell, to J. C. Kelso, $1.90 per cu. yd.

Lynchburg, Va.—Paving upper end of Cabell st., to S. B. Bennington, $20,000.

Norfolk, Va.—Paving Colonial ave., to Atlantic Bitulithic Co., Mutual Bldg., Richmond, Va., $2.20 per sq. yd.

Spokane, Wash.—Howard st., brick paving, J. A. Clark, $59,000; Rich st., grading, Mitchell Bros., $4,548; 33d ave., grading, Massie Bros. & Long, $3,550.

Sheboygan, Wis.—Paving, bids opened Feb. 11, to J. Rasmusson & Son, of Oshkosh, 14,308 sq. yds. brick paving on 6-in. Portland cement concrete, $1.91 per sq. yd.; total, $27,328; to Fred. Pestien, city, for 11,875 sq. yds. 13-in. macadam 4-in. granite, 9-in. limestone, $1.02 per sq. yd.; 5,567 lin. ft. combined curb and gutter, 49½c.; total cost, $14,868, and to John Braun, city, for 15,970 sq. yds. 12-in. macadam, 4-in. granite, 8-in. limestone, $1.03 per sq. yd.; 7,215 lin. ft. combined curb and gutter, 52c.; total, $20,201, and same contractor, 9,871 sq. yds., 13-in. macadam, 4-in. granite, 9-in. limestone, 98c. per sq. yd.; 4,620 lin. ft. combined curb and gutter, 50c.; total, $11,-984.

St. Francis, Wis.—Grading: Frank Brzezinski, 1165 1st ave., Milwaukee, 5,515 cu. yds.; to John F. Peterson, Fernwood, Station D, Milwaukee, 12,524 cu. yds.—M. J. McNamara, Clerk, Town of Lake.

BIDS RECEIVED

Omaha, Neb. — Supplies—Asphalt—Globe Asphalt Co., R. F. Conway Co., American Asphaltum & Rubber Co., California Asphaltum Sales Agency, Farr & McComb.

Lumber—Lew. Wentworth, C. N. Dietz Co., Bradford-Kennedy Co., Independent Lumber Co.

Stone, Brick, Cement, Sand, Coal, Flint, Etc.—C. W. Hull Co., J. P. Creedon & Sons, C. N. Dietz Co., L. B. McCann Co., C B. Havens Co., Sunderland Bros., E. B. Corrigan Co., Smith Brick Co., Bryant, Ford & McLaughlin and Commercial Land Co.

Cast Iron—Wearne Bros.

Albany, N. Y.—Construction of Road No. 5007, distance 3.28 miles: McNamee & Rice, Kingston, $34,500; Harper, Jova & Kehoe, Newburgh, $33,918.65; Mohawk Engineering & Construction Co., Schenectady, $34,887; Thos. O'Hern, Yonkers, $33,545,97; C. F. Jordan & Co., $35,062.46; H. P. Burgard Co., Buffalo, $34,500; Samuel Beskin, Fishkill Landing, $33,500; H. B. Sproul, Peekskill, $36,000; James E. Martin, Poughkeepsie, $35,896; DeGraff & Hogeboom, Bloomington, $36,000; Orange County Road Construction Co., New York City, $36,300; Gross, Copans & Spino, Newburgh, $33,812.

Hamilton, O.—Constructing State Highway B, Hamilton and Millville Road, Butler County: O. E. Robinson, Cincinnati, water bound macadam, $18,400; tar or asphalt macadam, $18,500; Garver Contracting & Transfer Co., Hamilton, O., water bound macadam, $15253; tarvia bound macadam, $18,462; Standard oil binder, $18,822; carbovia, $19,000; Horace Shields, city, water bound macadam, $16,858; tarvia macadam, $18,889; carbovia macadam, $18,889; Standard macadam binder, $18,739; A. Wirtz Transfer Co. & John H. Trunck, city, water bound macadam, $15,049, awarded contract; tarvia or carbovia, $18,888; taroid or carbovia, $18,888; Indian Refining Co. treatment, $18,503; Standard Oil Co., asphalt treatment, $18,299.

Youngstown, O.—Paving with brick, lowest bidders, S. H. DeGroodt, Evergreen ave., $9,843; Duquesne st., $10,400; St. Louis and Oak Hill aves., $11,799; Jas. McGlashan, Truesdale ave., $12,134, and Martin P. Connelly, Shehy st., $16,434.

Alva, Okla.—The city has recently entered into contract with G. A. Heman, of Chickasha, for improvements on Barnes ave., to cost $50,457.20, the approximate quantities and prices being as follows: Excavation,

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East St. Louis, Ill.—Detail of bids received Feb. 16, Illinois ave., from 13th st. eastwardly. Contract awarded to J. & P. Keeley. (A) J. & P. Keeley, (B) Geisel Construction Co.; (3) Gaynord & Sweeney; (D) Walter Coonan; (E) George W. McCray; (F) Reeb Bros.:

	(A)	(B)	(C)	(D)	(E)	(F)
3,890 ft. 24-in. pipe laid..	$1.80	$2.00	$2.17	$2.10	$1.85	$1.93
3,800 ft. 20-in. pipe laid..	1.10	1.70	1.71	1.50	1.42	1.26
5,875 ft. 18-in. pipe laid..	.80	1.00	1.06	1.20	1.25	1.10
10,140 ft. 15-in. pipe laid..	.70	.89	.95	1.00	.65	.78
360 ft. 12-in. pipe laid..	.50	.50	.65	.50	.50	.65
19,830 ft. granitoid curb...	.33	.33	.35	.34	.50	.40
22,080 ft. sandstone curb..	.60	.59	.53	.67	.65	.65
16,600 cu. yds. excavation placed in fil.....	.20	.25	.22	.20	.25	.25
12,500 cu. yds. filling in excess of excavation	.40	.44	.52	.45	.55	.45
380 cu. yds. brick masonry	7.75	9.00	8.00	8.50	8.00	9.00
58 stone inlets.....	12.00	12.00	11.00	12.00	12.00	12.00
2 c. i. caps, heavy....	10.00	12.00	12.00	....	15.00	15.00
26 c. i. caps, light.....	5.00	6.50	6.50	7.00	10.00	5.00
Imperial Sandstone Curb Paving—						
50,420 sq. yds. Albion.....	1.43	....	....	....	....	1.57
50,420 sq. yds. Alton.....	1.45	....	....	1.55	....	1.52
50,420 sq. yds. Banner.....	....	1.59	....	....	....	....
50,420 sq. yds. Egyptian...	1.45	1.63	....	1.57	....	1.60
50,450 sq. yds. Superior....	1.60	....	1.44	1.56	....	....
50,420 sq. yds. Terre Haute	....	....	....	1.58	....	....
50,420 sq. yds. Brazil.....	1.60	....	....	....	....	....
50,420 sq. yds. Danville....	1.70	....	....	1.57	....	1.70
50,420 sq. yds. Clinton.....	....	....	....	1.57	....	....
50,420 sq. yds. Indiana....	....	....	....	....	1.55	....
Totals	$127,175.50	$143,017.50	$136,304.50		$144,176.25	$140,042.80
Engineer's estimate						$141,579.30

East St. Louis, Ill.—Detail of bids received, Belmont ave. from Columbia pl. to V. & C. belt. Contract awarded to Meyer & Thomas. (A) Meyers Construction Co.; (B) Geisel Construction Co.; (C) Meyer & Thomas Construction Co.; (D) Geo. W. McCray:

	(A)	(B)	(C)	(D)
810 ft. 20-in. pipe laid.....	2.00	1.70	1.15	1.30
1,940 ft. 18-in. pipe laid.....	1.80	1.25	1.02	1.10
1,810 ft. 15-in. pipe laid.....	.80	.85	.70	.80
820 ft. 12-in. pipe laid.....	.55	.53	.52	.68
5,250 ft. sandstone curb.....	.70	.58	.60	.65
2,000 cu. yds. excavation placed in fill.....	.20	.20	.18	.25
3,500 cu. yds. excavation removed.....	.20	.25	.18	.25
88 cu. yds. brick masonry.....	9.00	9.00	9.00	8.00
11 stone inlets.....	12.00	10.00	14.00	12.00
8 cast iron caps.....	15.00	10.00	11.50	15.00
Paving—				
10,020 sq. yds. Albion.....	....	....	1.58	....
10,020 sq. yds. Alton.....	1.64	....	....	....
10,020 sq. yds. Banner.....	....	1.66	....	....
10,020 sq. yds. Egyptian.....	1.70	1.70	1.55	....
10,020 sq. yds. Superior.....	1.64	....	....	....
10,020 sq. yds. Terre Haute.....	....	....	....	....
10,020 sq. yds. Wabash.....	....	....	....	....
10,020 sq. yds. Danville.....	1.80	....	.....	....
10,020 sq. yds. Indiana.....	....	....	....	1.55
Totals	$29,262.80	$27,710.30	$25,112.70	$26,467.10
Engineer's estimate				$25,913.50

East St. Louis, Ill.—Detail of bids received, 25th st. and Waverly ave. and 40th st. Contract awarded to Meyer & Thomas: (A) Geisel Construction Co.; (B) Gaynor & Sweeney; (C) Meyer & Thomas Construction Co.; (D) Geo. W. McCray:

	(A)	(B)	(C)	(D)
230 ft. 12-in. drain.....	.40	.60	.58	.60
170 ft. 12-in. sewer laid.....	.50	.60	.58	.70
50 ft. 10-in. sewer laid.....	.45	.50	.50	.50
10,750 ft. sandstone curb.....	.58	.58	.60	.65
5,420 cu. yds. excavation placed in fill.....	.20	.30	.25	.25
3,650 cu. yds. excavation removed.....	.25	.15	.25	.25
12 cu. yds. brick masonry.....	9.00	8.50	9.00	8.00
4 stone inlets.....	12.00	12.00	12.00	12.00
870 ft. oak headers.....	.10	.10	.05	.10
1 cast iron cap.....	6.50	6.50	6.50	10.00
Paving—				
22,050 sq. yds. Albion.....	....	1.63	1.61	....
22,050 sq. yds. Alton.....	....	1.63	....	....
22,050 sq. yds. Banner.....	1.66	1.63	....	....
22,050 sq. yds. Egyptian.....	1.70	1.63	1.58	....
22,050 sq. yds. Superior.....	....	1.63	....	....
22,050 sq. yds. Terre Haute.....	....	1.63	....	....
22,050 sq. yds. Wabash.....	....	1.63	....	....
Indiana	....	....	....	1.55
1 50-ft. concrete steel bridge.....	$7,881.00	$7,381.35	$7,381.35	$7,500.00
On the bridge alone the Missouri Bridge & Iron Co. bid $7,990, and the Stupp Bro s. Bridge and Iron Co., $8,000.				
Total without bridge.....	$45,261.00	$44,845.00	$43.997.00	$43,933.00
Totals	53,142.00	52,226.35	51,378.35	51,433.00
Engineer's estimate				$51,560.50

9,050 cu. yds. at 35c. Trinidad sheet asphalt paving 15,230 sq. yds., at $2.09; concrete curb and gutter, straight, 10,800 lin. ft., at 68c.; concrete curb and gutter, rad. 6 ft., 510 lin. ft., at 90c.; furnishing and laying vitrified sewer pipe including excavation and backfill, 10-in, 710 lin. ft., at 50c.; 12-in., 1,040 lin. ft., at 70c.; 15-in., 840 lin. ft., at 90c.; 18-in., 840 lin. ft., at $1.10; 21-in., 720 lin. ft., at $1.35; 24-in., 920 lin. ft., at $1.65; catch basins, 48, at $35; manholes, 12, at $38; oak headers, 1,780 lin. ft., at 15c. —A. K. Hubbard, City Engineer.

Green Bay, Wis.—Paving West Walnut, Water to Bridge: Asphalt, J. F. Hill, Trinidad Lake, $2,144.97; Gilsonite, $2,077.14; Andrews, Bermudez, $2,300; Trinidad, $2,250; Blome granitoid, Rudolph Blome Co., $2,250; Hatch, cement filler, $2,249; asphalt filler, $2,346; Rasmussen, $2,401.84; J. F. Hill, $2,-183.73; sandstone block, Fielding & Shepley, $3,633.20; Hatch, $3,623.

Walnut, Water to Oakland—Asphalt, J. F. Hill, Trinidad Lake, $11,410.60; Gilsonite Lake asphalt, $11,303.10; Andrews, Trinidad Lake, $11,573; Bermudez Lake, $12,357; Blome granitoid, Rudolph Blome Co., $12,-950; brick, John Rasmussen & Son, $12,-454.72; J. F. Hill, $12,091.87; W. W. Hatch & Son Co., brick with cement filler, $12,599, with asphalt filler, $13,137; Fielding & Shepley, $13,840; creosoted blocks, John Rassmussen & Son, $15,002.30; General Contracting Co., $14,453; Fielding & Shepley, $15,780; W. W. Hatch & Son Co., $15,063; concrete, McGrath Construction Co., $8,-215.68; tar macadam, McGrath Construction Co., $8,538.20.

Shawano, Oakland to Allard—Asphalt, J. F. Hill, Trinidad Lake, $12,489.24; Gilsonite asphalt, $12,369.64; Andrews Co., Bermudez, $13,143; Trinuidad Lake, $12,845; Blome granitoid, Rudolph Blome Co., $14,450; brick, J. F. Hill, $13,625.44; W. W. Hatch, cement filler, $14,057; asphalt filler, $14,655; Fielding & Shepley, $15,500; creosoted blocks, W. W. Hatch & Son Co., $16,808; Fielding & Shepley, $17,660; concrete, McGrath Construction Co., $9,348.80; tar macadam, McGrath, 9,647.80; John Rassmussen & Son, $11,250.

Dousman, Bridge to Broadway—Asphalt, J. F. Hill, Trinidad Lake, $4,611.30; Gilsonite asphalt, $4,568.10; Andrews Co., Trinidad Lake, $4,700; Bermudez Lake, $4,725; Blome granitoid, Rudolph Blome, $4,900; brick, W. W. Hatch & Son, $4,899, cement filler, asphalt filler, $5,115, J. F. Hill, $4,-925.50; John Rassmussen & Son, $4,935.60; Fielding & Shepley, $5,518; sandstone block, Fielding & Shepley, $8,024; W. W. Hatch & Son, $8,182.

Dousman, Broadway to Allard—Asphalt, J. F. Hill, Trinidad Lake, $26,477.39; Gilsonite asphalt, $26,219.27; Andrews Co., Trinidad Lake, $27,141; Bermudez Lake, $28,260; General Contracting Co., $27,088; White Construction Co., $26,286.20; Blome granitoid, Rudolph Blome, $29,900; brick, J. F. Hill, $28,874.72; W. W. Hatch & Son, $29,621, cement filler; asphalt filler, $30,551; John Rassmussen & Son, $29,399.40; Fielding & Shepley, $32,000; creosoted blocks, W. W. Hatch & Son, $35,198; Fielding & Shepley, $36,690; General Contracting Co., $33,-540; John Rassmussen, $35,723.05; concrete, McGrath, $19,395.55; tar macadam, McGrath, $20,000.

Ashland, Dousman to Mather—Asphalt, J. F. Hill, Trinidad Lake, $12,551.90; Gilsonite asphalt, $12,430.04; Andrews, Trinidad Lake, $13,481; Bermudez Lake, $13,785; Blome granitoid, Rudolph Blome, $14,100; brick, W. W. Hatch, cement filler, $14,009; asphalt filler, $14,618; J. F. Hill, $14,044.69; creosoted blocks, General Contracting Co., $16,765; W. W. Hatch & Son, $16,812; concrete, McGrath, $9,561.75; tar macadam, McGrath, $9,805.47; John Rassmussen & Son, $11,500.

Ashland, Mason to 6th—Asphalt, J. F. Hill, Trinidad Lake, $8,030; Gilsonite asphalt, $7,956.46; Andrews Co., Trinidad Lake, $8,450; Bermudez Lake, $8,172; Blome granitoid, Rudolph Blome, $9,300; brick, J. F. Hill, $8,728.54; W. W. Hatch & Son, cement filler, $9,021; asphalt filler, $9,388; creosoted blocks, General Contracting Co., $10,153; W. W. Hatch, $10,712; concrete, McGrath, $6,061.21; tar macadam, McGrath, $6,245.00; John Rassmussen & Son, $7,195.66.

Fifth, Broadway to Greenwood—Asphalt, J. F. Hill, Gilsonite asphalt, $10,613.86; Trinidad Lake, $10,712.52; Andrews Co., Trinidad Lake, $11,094; Bermudez, $11,490; Blome granitoid, Rudolph Blome, $12,350; brick, J. F. Hill, $11,649.79; W. W. Hatch & Son, $12,034, cement filler; $12,528, asphalt filler; creosoted blocks, General Contracting Co., $13,735; W. W. Hatch & Son, $14,303; concrete, McGrath, $8,132.82; tar macadam, McGrath, $8,428.80; John Rassmussen & Son, $9,972.02.

Oakland, Walnut to Dousman—Asphalt, J. F. Hill, Gilsonite asphalt, $7,649.84; Trinidad Lake, $7,721.52; Andrews Co., Trinidad Lake, $8,102; Bermudez Lake, $8,380; Blome granitoid, Rudolph Blome, $8,900; brick, J. F. Hill, $8,402.48; W. W. Hatch & Son, $8,-679, cement filler; $9,038, asphalt filler; creosoted blocks, W. W. Hatch & Son, $10,228; concrete, McGrath, $5,872.45; tar macadam, McGrath, $8,427.80; John Rassmussen & Son, $7,174.76.

Chestnut, Mather to Phoebe—Asphalt, J. F. Hill, Gilsonite asphalt, $4,721.79; Trinidad Lake, $4,767.91; Andrews Co., Trinidad Lake, $5,096; Bermudez, $5,210; Blome granitoid, Rudolph Blome, $5,350; brick, J. F. Hill, $5,332.88; concrete, McGrath, $3,617.75 tar macadam, McGrath, $3,709.99; John Rassmussen & Son, $4,448.48.

Walnut, Bridge to Washington—Asphalt, J. F. Hill, Gilsonite asphalt, $2,395.66; Trinidad Lake, $2,418.34; Andrews Co., Trinidad Lake, $2,445; Bermudez Lake, $2,486; Blome granitoid, Rudolph Blome, $2,550; brick, J. F. Hill, $2,661.17; Fielding & Shepley, $2,949; W. W. Hatch & Son, $3,580, cement filler; $3,694, asphalt filler; sandstone block, Fielding & Shepley, $4,264.50; W. W. Hatch & Son,, $4,294.

Pine, Jefferson to Monroe—Asphalt, J. F. Hill, Gilsonite asphalt, $4,052.50; Trinidad Lake, $4,092.10; Andrews Co., Trinidad Lake, $4,422; Bermudez Lake, $4,521; Blome Rudolph Blome, $4,600; brick, J. F. Hill, $4,577.20; concrete, McGrath, $3,115.20; tar macadam, McGrath, $3,174.60.

Doty, Washington to Monroe—Asphalt, J. F. Hill, Gilsonite asphalt, $9,790; Trinidad Lake, $9,883.86; Andrews Co., Trinidad Lake, $10,236; Bermudez, $10,871; Blome—Rudolph Blome, $11,450; brick, J. F. Hill, $10,775.53; Fielding & Shepley, $12,300; concrete, McGrath, $7,336; Eul, Cochems & Niebel, $7,931.17; tar macadam, McGrath, $7,655.55; Eul, Cochems & Niebel, $8,306.61; creosoted blocks, Fielding & Shepley, $14,-000.

Stuart, Washington to Madison—Asphalt, J. F. Hill, Gilsonite asphalt, $6,976.48; Trinidad Lake, $7,043.32; Andrews Co., Trinidad Lake, $7,320; Bermudez Lake, $7,647; Blome, Rudolph Blome, $8,150; concrete, McGrath, $5,261.36; Eul, Cochems & Niebel, $5,639.53; brick, J. F. Hill, $7,677.75; Fielding & Shepley, $8,800; concrete, McGrath, $5,261.36; tar macadam, McGrath, $5,495; creosoted blocks, Fielding & Shepley, $10,000.

Crooks, Washington to Monroe—Asphalt, J. F. Hill, Gilsonite, $9,032.36; Trinidad Lake, $9,118.48; Andrews Co., Trinidad Lake, $9,496; Bermudez, $9,911; Blome, Rudolph Blome, $10,550; brick, J. F. Hill, $9,936.62; Fielding & Shepley, $11,400; concrete, McGrath, $6,783.62; Eul, Cochems & Neibel, $7,191.02; tar macadam, McGrath, $7,128; Eul, Cochems & Neibel, $7,535.50; creosoted blocks, Fielding & Shepley, $12,-950.

Chicago, Washington to Monroe—Asphalt, J. F. Hill, Gilsonite asphalt, $5,179.24; Trinidad Lake, $5,228.56; Andrews Co., Trinidad Lake, $5,446; Bermudez, $5,670; Blome, Rudolph Blome, $6,050; brick, J. F. Hill, $5,697.10; concrete, McGrath, $3,918.43; tar macadam, McGrath, $4,091.10.

Monroe, Main to Porlier—Asphalt, J. F. Hill, Gilsonite asphalt, $38,325.96; Trinidad Lake, $38,691.88; White Construction Co., $38,919.14; General Contracting Co., $40,-956; Andrews Co., Trinidad, $40,016; Bermudez Lake, $41,600; Blome, Rudolph Blome, $45,200; brick, J. F. Hill, $42,168.12; W. W. Hatch & Son, $43,850; cement filler, $45,679, asphalt filler; Fielding & Shepley, $47,196; creosoted blocks, W. W. Hatch & Son, $52,269; Fielding & Shepley, $53,966.80.

Howard, Jefferson to Madison—Asphalt, J. F. Hill, Trinidad Lake, $2,201.14; Gilsonite asphalt, $2,131.84; Andrews Co., Trinidad Lake, $2,211; Bermudez, $2,300; Blome, Rudolph Blome, $2,500; brick, J. F. Hill, $2,339.74; tar macadam, McGrath, $1,666.50; concrete, McGrath, $1,587.30.

School, Madison to Monroe—Asphalt, J. F. Hill, Gilsonite, $2,131.84; Trinidad Lake, $2,201.14; Andrews Co., Trinidad Lake, $2,-211; Bermudez, $2,300; Blome, Rudolph Blome, $2,500; brick, J. F. Hill, $2,339.74; tar macadam, McGrath, $1,666.50; concrete, McGrath, $1,587.30.

Moravian, Madison to Monroe—Asphalt, J. F. Hill, Gilsonite, $2,131.84; Trinidad, $2,-201.14; Andrews Co., Trinidad Lake, $2,211; Bermudez, $2,300; Blome, Rudolph Blome, $2,500; brick, J. F. Hill, $2,339.74; tar macadam, McGrath, $1,666.50; concrete, McGrath, $1,587.30.

Adams, Main to S. Line Astor Park—Asphalt, J. F. Hill, Gilsonite, $28,769.29; Trinidad Lake, $29,042.97; Andrews Co., Trinidad Lake, $29,704; Bermudez, $30,890; General Contracting Co., $29,956; Blome, Rudolph Blome, $32,500; brick, McGrath, Athens brick, $30,430; Metropolitan or Danville brick, $31,114.20; J. F. Hill, $31,288.15; W. W. Hatch & Son, $31,735, cement filler; $33,103, asphalt filler; Fielding & Shepley, $34,498; creosoted blocks, W. W. Hatch & Son, $38,036; Fielding & Shepley, $39,660; tar macadam, McGrath, $21,650.31; concrete, McGrath, $20,698.

SEWERAGE

Corey, Ala.—Corey Land Co. will lay 2½ mi. of service sewers and 8½ mi. of sanitary sewers of various sizes.—Meade & Huey, Engineers; Robert Jemison, Birmingham, President.

Dothan, Ala.—City will construct concrete storm sewers and sanitary sewers; bids have been invited.—R. W. Lisenby, Clerk.

Hartsells, Ala.—City is planning construction of sewer system.—Address, the Mayor.

Chico, Cal.—City Trustees will call election on $35,000 bonds for storm water sewer system.

Pleasanton, Cal.—Citizens have voted $40,000 sewer bonds.

San Anselmo, Cal.—City will expend $15,-000 for construction of sewers.

San Francisco, Cal.—Residents of Ocean View district are agitating construction of sewer on San José ave.

Boulder, Col.—City Engineer has submitted sewer plan for North Boulder.

Leadville, Col.—Construction of entirely new sewer system is proposed.

Ansonia, Conn.—Bids will be received in May for preliminary work of reconstructing the trunk line sewer, to cost about $35,000. —Vincent B. Clark, Engineer.

Kissimmee, Fla.—Citizens will vote March 9 on $43,000 sewer and water bonds.

Pocatello, Ida.—Construction of more complete sewerage system is favored.

Sandpoint, Ida.—Plans for construction of sewer system for city have been completed.

Bushnell, Ill.—Citizens will vote April 20 on $25,000 bonds for construction of sewer system.

Canton, Ill.—Plans and specifications have been prepared by Consulting Engineer Maltby for building of sewer system; cost, $50,000.

Chicago Heights, Ill.—Plans are being prepared by City Engineer for sanitary and storm water sewers for east side.

DeKalb, Ill.—Plans have been completed for the construction of a sewer system; work wil begin about June 1.

Geneva, Ill.—Council has selected an engineer to make plats for installation of system of sewers.

Goshen, Ind.—City is considering construction of sewer system.

Lebanon, Ind.—City is considering constructing vitrified pipe sewer on south side; City Engineer J. N. Fulwider is preparing preliminary plans.—E. Connor, Chairman Board of Public Works.

Richmond, Ind.—Bids will be received by Board of Public Works about March 10 for construction of 1¼ miles of vit. pipe sewer, ranging from 12-in. to 24-in.—F. R. Charles, City Engineer.

Toleston, Ind.—A report has been submitted by Engineers Alvord & Burdick, 140 Dearborn st., Chicago, for $300,000 sewer system.—W. S. Gallagher, President Board of Trustees.

Leon, Ia.—Council will consider construction of sewers, a sewer outlet and sewage disposal or purification plant.

Sioux City, Ia.—Council has instructed Engineer G. Y. Skeels to prepare plans and specifications and estimate cost of constructing sewers for residents of Cole's Addition.

Louisville, Ky.—Sewer Commission, P. L. Atherton, chairman, Equitable Bldg., is considering deepening of Beargrass Creek and constructing concrete walls; cost, $275,000 to $300,000.

Winchester, Ky.—City has rejected all bids received for sewerage and city hall bonds.

Baltimore, Md.—Board of Awards has rejected all bids for the construction of storm water sewers; also all bids for construction of underwater conduits at Back River Disposal Plant.

Amesbury, Mass.—Construction of sewer system is being considered.

Lowell, Mass.—City will expend about $50,000 on sewer construction this year.—Geo. Bowers, City Engineer.

Malden, Mass.—Street and Water Commission has asked for $40,000 for sewerage and $20,000 for surface drainage.

Marion, Mass.—Town will vote on repair of city pipe lines that carry sewage to filter beds, also on remodeling sewage pumping station.

Austin, Minn.—Council has decided to construct storm sewer on St. Paul st.

Meridian, Miss.—City Engineer W. G. Wetmore will prepare plans and specifications and advertise for bids for construction of storm sewers.

Chillicothe, Mo.—Estimates will be prepared by City Engineer for construction of sewer on E. Polk st.

Kansas City, Mo.—Citizens will vote April 5 on $100,000 bonds for sewer department.

St. Louis, Mo.—Bids opened Feb. 11 for constructing 5 to 11-foot sewer in new North

Harlem Creek Joint Sewer District have been rejected; cost $246,120.—W. B. Dryden, Secretary Board of Public Improvements.

Helena, Mont.—Council is considering construction of sewers in Broadwater Addition.

Omaha, Neb.—Council Committee of the Whole has authorized City Engineer to proceed with building of necessary sewers to extent of $98,000; about $10,000 of this amount is to be devoted to catch basins, intersection work and inspection.

Haddonfield, N. J.—Council has passed ordinance for lateral sewer on Haddon ave.

Newark, N. J.—Board of Street and Water Commissioners has decided to construct 12-in. pipe sewer in ave. A and 8-in. branch sewers in three streets.—M. R. Sherrerd, Chief Engineer.

Roselle Park, N. J.—Borough Council has sold $54,000 sewer bonds to R. M. Grant & Co., New York, at $102.52.

Vineland, N. J.—State Board of Health has notified authorities that unless they take immediate action for installation of proper plant to purify effluent from their sewage disposal beds, injunction proceedings will be instituted by State to restrain borough from using the present beds.

Nogal, N. M.—Plans will be prepared by Engineer W. P. Bullock for installation of sewer system.

Yonkers, N. Y.—Plans and maps of Nepperhan Valley sewer having been approved by committee which had them under consideration, resolution has been passed by Council authorizing taking of casements along the proposed line of new trunk sewer.

Ashboro, N. C.—City is considering $50,000 bond issue for sewerage and for water works.—H. M. Worth, Mayor.

Jamestown, N. C.—Council is considering construction of sewer on Milwaukee st. and 2d ave.

Bellefontaine, O.—Engineers Riggs & Sherman, Nasby Bldg., Toledo, have been selected to prepare plans for a system of sewers.

Circleville, O.—City will build two sewers of vitrified brick or cement; cost, about $6,000.—Fred R. Nicholas, City Auditor.

Elyria, O.—Estimate of cost of constructing sewer on Williams st. will be prepared.

New Philadelphia, O.—State Board of Health has ordered city to complete sewer system at once.

Clinton, Okla.—Bids will be received March 15, 8 P. M., for constructing 1,200 ft. of 18-in., 4,970 ft. of 15-in., 1,520 ft. of 12-in., 10,900 ft. of 10-in., and 7,000 ft. of 8-in. sewers, of first-quality pipe, together with manholes and other appurtenances.—J. L. O'Hearn, Consulting Civil Engineer; C. C. Smith, City Clerk.

Wagoner, Okla.—Citizens will vote on $10,000 bonds for sewer construction.

Allentown, Pa.—County Engineer R. S. Rathburn is preparing plans for sewage disposal plant at county house.

Scranton, Pa.—City will let contracts before March 15 for Twentieth and Tenth Ward sewers.—C. V. Terwilliger, Director of Public Works.

York, Pa.—Council is considering construction of terra cotta storm water sewer on East Philadelphia and two other streets.

Columbia, S. C.—City will construct reforced concrete storm sewer on College st.; distance, 412.7 ft.—G. E. Cooper, City Treasurer.

Huron, S. D.—Bids will be received by Council March 4 for constructing lateral sewers requiring 13,090 lin. ft. from 8 to 15-in. pipe, 26 manholes, 4 standard design flush tanks, 2 combined manholes and flush tanks, etc.—L. P. Wolff, St. Paul, Minn., Engineer.—J. H. Kemerer, City Clerk.

Amarillo, Tex.—Citizens will vote March 23 on $40,000 sewer extension bonds.

Brownsville, Tex.—Brownsville Sewerage Co. has increased stock to $26,500, to enable company to adopt septic method of sewage disposal.

Dallas, Tex.—Citizens will vote April 5 for construction of sanitary sewage disposal plant and necessary connecting and trunk lines.

Big Stone Gap, Va.—Citizens have voted $14,000 bonds for sewers, street improvements and bridge over Powell River.

Lynchburg, Va.—Council has adopted resolution for sewer system in territory bounded by Park, 5th and Buchanan sts.; cost $7,500.

Portsmouth, Va.—Sewerage Commission has been granted permission to advertise for bids for installing machinery in sewage pumping station.

Waynesboro, Va.—Citizens will vote March 15 on $5,000 bonds to take over private sewer systems and extend them.

Kenewick, Wash.—Hanford & Blackwell, Seattle, have been selected to prepare plans for sewer system.

Vancouver, Wash.—City Engineer H. C. Latter is preparing plans for 30 and 34-in. pipe sewers; cost about $57,000.

Evansville, Wis.—Plans have been completed for sewer system.

Plymouth, Wis.—Bids will be received March 10, 8 p. m., for constructing 9,426 ft. of 6-in., 783 ft. of 8-in. and 630 ft. of 10-in. vit. pipe sewers; 410 ft. of 4-in. c.-i. force main and 84 ft. of 8-in. c.-i. pipe for river crossings, 49 manholes, 28 lampholes and one electric pumping station.—W. G. Kerchopper, 31 Vroman Bldg., Madison, Engineer; G. W. Jackson, City Clerk.

Buffalo, Wyo.—City Engineer E. L. Clarke will estimate cost of sewerage system.

London, Ont., Can.—Plans have been completed by W. Chipman, Toronto, for storm water sewers for South London.

CONTRACTS AWARDED

Montgomery, Ala.—Five thousand feet 12-in. sewer, to J. M. Mitchell, City; cost, $10,000.

Newman, Cal.—Sewer system, to C. Vincent, Oakland, $23,079.

Perry, Fla.—Sanitary sewerage system, requiring abut 3 miles of pipe, 8 to 15-in.; manholes, flushtanks, etc., from plans of Wm. M. Lyon, Engineer, 305 Duval Bldg., Jacksonville, to Bryan & Co., of Jacksonville, for $13,552, including pipe.

Grinnell, Ia.—Constructing storm sewers, bids opened Feb. 10, to Guy E. Smith, Indianola, $5,236.

Syracuse, N. Y.—Twenty-inch sewer in Fourth Ward, to John W. Davin, $10,303.

Ardmore, Okla.—Sewer extensions, to Healy Construction Co., McAlester, $25,-640.05; four other bidders.

Houston, Tex.—Sanitary sewer in Fourth Ward, to Kelso & Vautrin, of Galveston, for about $10,000; bids opened Feb. 7.

Salt Lake City, Utah—Sewer extensions Nos. 220 and 249, to James Kennedy Construction Co., City, $134,287 and $33,730, respectively.—G. F. McGonagle, City Engineer.

Norfolk, Va.—Sewers in Greater Ghent, to E. J. McGuire, City, $12,570.—W. T. Brooke, City Engineer.

Walla Walla, Wash.—Sewer line in alley between Main and Alder and 1st and 5th sts., to G. H. Sutherland Co.

Hamilton, Ont., Can.—Outfall sewer, in connection with sewage disposal works, to F. H. Dickenson, city, $125,504.

BIDS RECEIVED

Canby, Minn.—Constructing about 8,600 ft. 6-in., 8,400 ft. 8-in., 1,200 ft. 10-in. sewer, 1,450 ft. 4-in., 4,075 ft. 6-in., 350 ft. 8-in., 800 ft. 10-in., tile subdrain, 50 manholes, sewage settling tank, 6 or 8-h.p. gasoline engine, 4-in. centrifugal pump, vertical submerged, sewage well and pump house from plans of John Wilson, Engineer, Mankato: G. S. Redmond, Pipestone, $25,759; L. H. Skiff, Brookline, S. D., $27,013; Roberts & Few, Brookings, S. D., $26,869; L. W. Schruth, Fargo, N. D., $26,579; Pastoret & Lawrence, Duluth, $27,518; W. E. Rosecrans, Canton, S. D., $25,894; Cook Construction Co., Des Moines, $26,874; Elkhorn Construction Co., Leigh, Neb., $29,128; W. D. Lovell, Minneapolis, $25,106; Tanner Bros., Minneapolis, $24,384; Frazer & Danforth, Rochester, $25,764.

WATER SUPPLY

Corey, Ala.—Corey Land Co. will lay 8½ miles of water mains.—Meade & Huey, Engineers; Robert Jemison, Jr., Birmingham, President.

Dothan, Ala.—City will construct 9,900 ft. of c.-i. water mains; bids have been invited.—R. A. Lisenby, Clerk.

Hartsells, Ala.—City is planning construction of water works.

Opelika, Ala.—Citizens will vote March 28 on $85,000 bonds for water works and electric light plant.

Sylacauga, Ala.—Citizens have voted bonds for extension of water works.

Booneville, Ark.—Booneville Light & Water Co. is considering construction of pumping station and electric power plant to be operated by hydraulic turbines.

Fort Smith, Ark.—Council has passed ordinance providing for extensions to water system; cost $77,000.

Hardy, Ark.—Dr. Buford, Memphis, Tenn., is considering construction of water works.

Harrison, Ark.—Harrison Water Co. will construct 25,000 ft. of mains and two additional storage tanks.

Los Angeles, Cal.—Fire Board will at once install hydrants in South Hollywood district.

San Diego, Cal.—Contract will soon be let for water tank and standpipe for Point Loma; also for one on University Heights; cost $10,000.—E. M. Capps, City Engineer.

Santa Barbara, Cal.—Citizens will vote on $300,000 bonds to complete municipal water works, including tunnel, reservoirs and pumping station.

Wilmington, Del.—Chief Engineer Kienle will obtain prices and other information for purchase of duplicate pump for Cool Spring Station.

Dalton, Ga.—City is considering election to vote on bonds for improvements to water works.

Eastman, Ga.—Citizens will vote March 15 on $12,000 bonds for improving water works and $28,000 bonds for sewers.—Arthur Pew, Atlanta, Engineer; Dr. J. D. Herman, Mayor.

Lafayette, Ga.—Citizens will vote March 22 on $40,000 bonds for construction of water works and electric light plant.

Savannah, Ga.—Bids will be received by Superintendent of Water Works for boiler and 1,400 valves for pumps at new station.

Midvale, Ida.—Council will consider installation of water works system.

Chicago, Ill.—Bill before the Board of Aldermen provides for compulsory installation of high pressure service in high buildings.

Chicago Heights, Ill.—Council has passed ordinance for laying water main in blocks 61 and 68; also ordinance empowering the city to bond itself $30,000 for reconstructing the water works system.

Decatur, Ill.—City is considering considerable extensions of water mains.

New Athens, Ill.—Citizens will vote in spring on construction of water works.

Pekin, Ill.—City is considering issuance of bonds for building and operating water works plant.

Rock Island, Ill.—Superintendent of Water Works D. C. Kelly has recommended laying of 15-in. main on 2d ave. and a 24-in. main on 4th ave.

Fort Wayne, Ind.—City will purchase between 3,000 and 9,000 water meters; $50,000 will be expended.

Sioux City, Ia.—Council is considering construction of concrete conduit across bend in Perry Creek.

Plains, Kan.—Commercial Club has definitely determined that Plains will bore for artesian water.

North East, Md.—Town Commissioners are considering municipal water works.

Holyoke, Mass.—Board of Water Commissioners has recommended that city take steps immediately in matter of building another large storage basin in vicinity of present high pressure reservoir.

Malden, Mass.—Street and Water Commission has asked for $15,000 for extension of water works.

Marion, Mass.—Town will vote on extending water system.

Quincy, Mass.—Council is considering order appropriating $45,000 for installation of water meters.

Saginaw, Mich.—Board of Water Commissioners has recommended intake for east side station; cost about $20,000.

Duluth, Minn.—Bids have been ordered advertised for $150,000 water and light bonds.

Kansas City, Mo.—Citizens will vote April 5 on $1,500,000 water works bonds.

Hardy, Neb.—Engineers Grant & Letton, 401 and 402 F. & M. Bldg., Lincoln, are preparing preliminary plans for $12,000 system of water works.

Tecumseh, Neb.—Council is considering water works extension plan.

Manchester, N. H.—City will lay 20-in. water main in McGregorville district.

High Bridge, N. J.—Citizens have defeated proposition to increase water supply.

Ithaca, N. Y.—Plans are being prepared for construction of dam 15 ft. high and 300 ft. long, capable of holding 500,000,000 gals of water.

Poughkeepsie, N. Y.—Mayor J. K. Sague is considering matter of better water system.

Ashboro, N. C.—City is considering $50,000 bond issue for water works and sewerage.—H. M. Worth, Mayor.

Hendersonville, N. C.—City will install filtering plant for water works.—R. H. Staton, Mayor.

Grand Forks, N. D.—Citzens have voted bonds for construction of intake plant for city water plant.

Andover, O.—Engineer L. E. Chapin, Akron, is surveying, preparatory to submitting plans to city for construction of a water works system, sewerage system and disposal plant.

Dayton, O.—City Engineer Cellarius will prepare plans for storm water sewer on Creighton ave.

Norwood, O.—Council has passed ordinance providing for $15,500 bond issue for water works improvements, including two new wells and additional piping.

Sapulpa, Okla.—Council has contracted with engineering firm of Harper & Goodwin, of Kansas City, to supervise the construction of city's new $125,000 water plant.

Creswell, Ore.—Council has granted R. H. Parsons a 25-year franchise to furnish city with water.

Eugene, Ore.—Council of Creswell has granted R. H. Parsons 25-year franchise to furnish city and its people with water; steam pumping plant will soon be installed, and water will be taken from deep wells.

Springfield, Ore.—Water works reservoir will be enlarged.

Edinboro, Pa.—Borough has voted to install water works.

Snrewsbury, Pa.—Council will soon ask proposals for proposed new water works plant; work consists of iron pipes, water plugs and other necessary supplies.

Pawtucket, R. I.—Councils have passed joint resolution appropriating $60,000 for water works construction.

Huron, S. D.—Bids will be received March 4 by Council for furnishing and laying c.-i. water mains, requiring in all 15,712 lin. ft. of from 4 to 10-in. pipe, 20,000 lb. special castings, 15 new 5-in. fire hydrants.—L. P. Wolff, St. Paul, Minn., Engineer.—J. H. Kemerer, City Clerk.

Knoxville, Tenn.—Council has approved plan of Water Works Commission to build addition to sedimentation basin at cost of about $4,000.—E. N. Chisholm, Manager.

Morristown, Tenn.—Council has authorized $10,000 appropriation for extension of water and light plants.

Brownwood, Tex.—Council has decided to install filtering plant; cost $10,500; committee has been appointed to select the best filtering system being offered by bidders.

Dallas, Tex.—Municipal Commission has ordered taking of bids on drilling of deep well to Trinity sands in vicinity of Bachman Dam.

Greenville, Tex.—Citizens will vote March 21 on $20,000 bonds for improvement of water works system.

Houston, Tex.—W. W. Baldwin, South End Land Co., Burlington, Ia., is considering construction of water works in connection with development of townsite of Bellaire.

Lufkin, Tex.—City is considering laying of 1½ miles of 6-in. mains.

Milford, Tex.—East Side Water Co. has been organized.—W. W. Darrow, President.

Quanah, Tex.—L. C. Fountain, of the engineering firm of Fountain & Shaw, Houston, has recommended to city that a dam be built across South Groesbeck Creek.

Snyder, Tex.—Citizens will vote on bonds for construction of water works.

San Antonio, Tex.—Mayor Callaghan has appointed committee to go into matter of purchase of water works without delay.

Vernon, Tex.—Citizens will vote April 5 on $15,000 bonds for extension of water works.

Murray, Utah.—Mayor Bentz has urged Council to look into matter of water site.

Park City, Utah.—Citizens will vote March 21 on $50,000 bonds for establishment of water supply.

Willard, Utah.—Engineer will make estimates of cost of constructing water works system.

Big Stone Gap, Va.—Citizens have voted $26,000 water works bonds.

Fredericksburg, Va.—City will at once improve water system at cost of $5,796.20; over $12,000 will be spent during year.

Waynesboro, Va.—Citizens will vote March 15 on $10,000 bonds for erecting 300,000-gal. standpipe and laying additional water mains.

Ellensburg, Wash.—City Engineer G. N. Miller will soon prepare plans for proposed water system.

Everett, Wash.—Pressure standpipe is to be erected by the Everett Railway, Light & Water Co. to give service to southwestern portion of city too high to be taken care of by reservoir.

Monroe, Wash.—Bids will be received April 1 for construction of reservoir.—S. A. Buck, Monroe Water Co., Manager.

Tacoma, Wash.—Council has adopted ordinance directing Commissioner of Public Works to call for bids for construction of standpipe.

Parkersburg, W. Va.—Engineers G. W. Fuller and G. W. Fuertes, New York, have recommended construction of filtration plant and use of water from Ohio River.

Ravenswood, W. Va.—City will soon receive bids for water works franchise.

West Allis, Wis.—Council has decided to issue $2,500 bonds for water main extensions.

Worland, Wyo.—Town has voted to issue $40,000 bonds for installation of proposed water works system.

CONTRACTS AWARDED

San Francisco, Cal.—Pumping station, 2d and Townsend sts., to Healy-Tibbitts Co., 268 Market st., $138,300.

Kansas City, Kan.—15,000,000-gal. pump, to Short Mfg. Co., city, $18,700.

Dayton, O.—575 tons 3 to 12-in. c.-i. pipe and 50 tons c.-i. specials, bids opened Feb. 12, to U. S. C. I. Pipe & Fd'ry Co., $14,456.

Dallas, Tex.—200 tons of 6-in. water pipe, to Edwards & Gray, 70c. per ton.

Greenville, Tex.—Deep well at water works, to C. L. Witherspoon, Corsicana, about $11,000.

Salt Lake City, Utah.—Water mains, to P. J. Moran, $49,438.60; eight other bidders.

LIGHTING AND POWER

Corey, Ala.—Corey Land Co. will lay 8½ miles of gas mains.—Meade & Huey, Engineers; Robert Jenison, Jr., Birmingham, President.

Sylacauga, Ala.—Citizens have voted bonds for construction of electric light plant.

Booneville, Ark.—Booneville Light & Water Co. is considering construction of electric power plant and pumping station, to be operated by hydraulic turbines.

Eureka Springs, Ark.—Eureka Springs Electric Co. has been incorporated with $100,000 capital stock.—Henry C. Brent, President.

Hardy, Ark.—Dr. Buford, Memphis, Tenn., is interested in organization of company to construct electric light and water plant.

Ft. Bidwell, Cal.—Lighting of town by electricity is being considered.

Gridley, Cal.—Board of Trustees has decided to acquire a municipal power plant for generating or transforming electric current for use in supplying power and light for municipal purposes and for sale to subscribers; cost $17,500.

Oroville, Cal.—Oro Light & Water Co. will construct dam for power purposes at Humbug, near Stirling City; cost $250,000.

Santa Cruz, Cal.—Council has adopted resolution providing for municipal improvements, including installation of a new lighting plant; total cost $160,000.

Stockton, Cal.—Council has decided that $35,000 appropriation be made from next tax levy for installing electroliers throughout business section of city, to take place of present overhead lighting system, or to augment it.

Colorado Springs, Col.—Colorado Springs Light & Power Co. is planning immediate extensions of gas mains in Colorado Springs, Colorado City and Ivyville; cost about $20,000.—R. L. Holland, Secretary-Treasurer.

Montrose, Col.—Committee, Alderman Hill, Chairman, has been appointed to investigate cost of lights in this city; municipal ownership of plant favored.

Willimantic, Conn.—Willimantic-Rockville Lighting Co. will erect transformer house at Eagleville.

Wilmington, Del.—Water Commissioners have decided to harness flow of water from the new reservoir in Brandywine hundred to generate electricity; other city officials are advocating advisability of having municipal electric lighting plant.—Benjamin F. Shaw, President Water Board.

Dalton, Ga.—City is considering election on bonds for improvements to light plant.

LaFayette, Ga.—Citizens will vote March 22 on $40,000 bonds for construction of electric light plant and water works.

Oliver, Ga.—Oliver Electric Power Co. is planning to construct power plant; cost about $15,000.—D. G. Zeigler & Co., Jacksonville, Fla., Engineers.

Dixie, Ida.—S. R. Gayton, Philadelphia, Pa., is considering installation of electric light plant.

Grand Junction, Ia.—G. W. Nicholson Light Co. will install plant this spring.—W. W. Wertz, Manager.

Kiowa, Kan.—Installation of 50-kw., 3-phase, 60-cycle, 2,300-volt generator and direct-connected engine is being considered.—F. T. Reid, Superintendent.

Thibodaux, La.—City proposes to install three direct-connected units of 60-kw. each at municipal electric light plant.—A. R. Staunton, Superintendent.

Smithville, Md.—Smithville Electric Light Co. is considering rebuilding of electric light plant.—Harry Gordon, Manager.

Falmouth, Mass.—Town has voted $5,000 for electric street lights.

Malden, Mass.—Financial Commission will recommend establishment of municipal lighting plant.

Malden, Mass.—Street and Water Commission has asked for $34,500 for street lighting for year.

Duluth, Minn.—Commercial Club Committee which has been working out a plan for great white way in downtown district has selected universal design for posts.

Duluth, Minn.—Bids have been ordered advertised for $150,000 light and water bonds.

Mazeppa, Minn.—Zumbro Power Co. is considering plans for construction of dam 50 ft. high across Zumbro River and the installation of hydroelectric power plant in towns of Mazeppa and Zumbro.

Pine River, Minn.—Application for franchise to maintain and operate electric light plant in the village has been asked for by H. A. and T. L. Arvig.

Liberty, Mo.—Samuel Diemer has secured franchise to furnish city with natural gas.

Paterson, N. J.—Public Service Co. will spend $100,000 in next three years in placing underground all overhead wires.

Trenton, N. J.—Finance Committee is considering $5,000 appropriation for introduction of system of special lighting for streets in center of city.

Corning, N. Y.—City is considering lighting question; contract with Corning Gas & Electric Co. expires in October.

Grand Forks, N. D.—Citizens have voted bonds for improvements to electric light plant.

Defiance, O.—Valley Power Co., composed of Congressman T. T. Ansberry and H. D. Bishop, of this city, and eastern capitalists have asked Council for franchise to erect poles and equipment in streets and alleys of city to furnish power to manufacturers.

Hamilton, O.—Citizens of Lindenwold are circulating petitions asking Council to provide for extension of the gas mains.

Newport, O.—Aldermen have passed ordinance for sale of natural gas franchise; soon as bill is approved by Mayor Krieger preparations will be made for receiving bids by the General Council.

Wetumka, Okla.—Citizens have voted $36,000 electric light bonds.

La Grande, Ore.—Walla Walla Interurban Railroad, Portland, is considering establishment of gas plant.

Portland, Ore.—Council has passed ordinance adopting same type of auxiliary street lighting post for east side that is required on the west side of the river.

Decherd, Tenn.—City is considering construction of electric light plant.

Morristown, Tenn.—Council has authorized $10,000 appropriation for extension of light and water plants.

Rogersville, Tenn.—Rogersville Electric Light & Power Co. desires prices on the following electrical equipment: 100-kw. a.-c. generator, switchboard, transformers, meters, etc.

Trenton, Tenn.—Citizens will vote March 26 on issuance of $12,000 bonds for construction of electric light plant.

Houston, Tex.—W. W. Baldwin, South End Land Co., Burlington, Ia., is considering construction of electric light plant in connection with development of townsite of Bellaire.

Houston, Tex.—H. W. Bennett will make application to Council of Houston Heights for 50-year franchise for gas company just being organized.

Grapevine, Tex.—J. W. Day, Fort Worth, will construct electric light plant.

Jefferson, Tex.—Citizens' Gas & Oil Co. has been incorporated, $10,000 capital stock, by R. B. Walker, T. J. Rogers and W. B. Ward.

Falls Church, Va.—Town Council is considering better lighting of town.

Fredericksburg, Va.—City will advertise for bids for electric light, heat and power franchise.—C. R. Howard, Chairman.

Tacoma, Wash.—Seattle-Tacoma Power Co. will expend $500,000 in improvements.—Morton Ramsdell, Manager.

Sherbrooke, Que., Can.—St. George Electric Co., city, will build a new concrete dam and electric plant on Chaudiere River; cost $75,000.—J. W. Gregoire, Secretary-Treasurer.

CONTRACTS AWARDED

Windsor, Conn.—Furnishing 167 60 c.p. lamps of tungsten type, to Hartford Electric Light Co., Hartford.

Columbus, Ind.—Improvements to plant of Central Indiana Lighting Co., to Westinghouse, Church, Kerr & Co., 10 Bridge st., New York.

Elwood, Ind.—Street lights for ten years, to Elwood Electric Co.

Indianapolis, Ind.—Light and heat in public comfort station, Kentucky ave. and Illinois st., to Merchants' Heat & Light Co., on a bid of 3c. per kw. hour for lights and 40c. per 1,000 lbs. condensation for steam heat, with a maximum charge of 20c. a cu. ft. of radiation a season.

Boone, Ia.—Gas plant for Col. E. G. Pratt, of Boone Gas Co., to American Construction Co., Newton.

Gloucester, Mass.—Lighting plant, to B. F. Sturtevant Co., 34 Oliver st., Boston.—F. F. Wonson, Clerk.

West Boylston, Mass.—Municipal electric light plant, to Delta Electric Co., of Worcester, $13,479.

Ruleville, Miss.—Furnishing electricity, city to purchase power and install lights and lighting apparatus, to Southern Power Co., Charlotte, N. C.

St. Louis, Mo.—Furnishing and installing in new power house of the City Insane Asylum 4 water tube boilers, to the John O'Brien Boiler Works, city, $22,800; and for 2 automatic engines, 2, 3-wire D. C. generators and switchboards, to Brownell Co., city, $4,438.—W. B. Dryden, Secretary Board Public Works.

Atlantic City, N. J.—Electric light plant, to Atlantic City Construction Co.

Albemarle, N. C.—Erection and equipment of electric lighting plant, to Tucker & Laxton, Charlotte.—J. M. Bandy, Greensboro, Engineer.

York, Pa.—Merchants' Electric Light,

Heat & Power Co., for furnishing light to the borough of North York, 16c. each night for 2,000 c.p. arc lights and 8c. a night for 100 c.p. arc lights.

BIDS RECEIVED

Akron, O.—Lighting streets of city with gas and gasoline—Cleveland Vapor Light Co., only bidder, for gas on six months' basis, $16.85 per light; gas for one and two years, the same; for three years, $16.50; for four years, $16.25; for five years, $16; city at present time is paying Cleveland company $18 yr. for lighting streets wtih gas. Gasoline for all night schedule for every night in year, $27 yr.; city is now paying the company $22.35 yr. for gasoline for moonlight schedule.

FIRE EQUIPMENT

Montgomery, Ala.—Council will consider purchase of fire apparatus.

Bisbee, Ariz.—Fire Chief Davis has asked for purchase of additional hose.

Chico, Cal.—City Trustees will call election on $10,000 bonds for fire department improvement.

Portersville, Cal.—Citizens will vote on $15,000 bond issue for purchase of additional chemical engine and equipment, including 150 ft. of ladders and auto hose wagon with capacity of 1,000 ft. of hose.

Richmond, Cal.—Council is considering installation of fire alarm system.

Sacramento, Cal.—Fire Chief H. A. Guthrie has recommended purchase of extension ladder.

Trinidad, Col.—Erection of fire station at Pine and Willow sts. is being considered. Council will take steps to improve fire department; purchase of auto fire wagon favored.—R. A. Daugherty, Chief.

Washington, D. C.—Bids will be received March 15 by Commissioners for furnishing one combination chemical engine and hose wagon.—Cuno H. Rudolph, President.

Waycross, Ga.—Fire escapes will have to be placed on all buildings of three stories and over immediately, according to decision of Council.

Cottonwood, Ida.—City will reorganize and equip fire department.

Cairo, Ill.—Committee, consisting of Mayor and three members of Council, will visit St. Louis to inspect fire department, fire protection needed.

Evanston, Ill.—Fire Committee has recommended that city adopt motor-driven fire apparatus.

Greenville, Ill.—City will erect headquarters building.—J. L. McCracken, Chief.

Joliet, Ill.—Fire Marshal Frank E. Langdon will advertise for bids on new hose cart for Engine Co. No. 4 and 1,000 ft. of new hose.

Monmouth, Ill.—City will purchase new hose and extend fire alarm system.—T. A. Wilcox, Chief.

Pekin, Ill.—City will add new apparatus. —J. F. Jaeckel, Chief.

Peoria, Ill.—Board of Fire Underwriters has recommended replacing of old type fire alarm boxes with standard street boxes and installation of all overhead wires in underground conduit.

Sparta, Ill.—City will install fire alarm system. F. H. Sproul is interested.

Marion, Ind.—Council is considering erection of engine house.

Martinsville, Ind.—Purchase of auto hose wagon is being considered.—J. M. Blair, Chief.

New Albany, Ind.—City will purchase 500 ft. of fire hose.—Address Mayor Green.

Rockport, Ind.—Improvements to fire department are being considered.—S. E. Kercheral, Mayor.

Rushville, Ind.—City will purchase 1,000 ft. of hose and additional fire alarm boxes. —B. A. Block, Mayor.

Sullivan, Ind.—City is considering improvements in fire department. Capt. W. M. Drapers is interested.

Wabash, Ind.—City will install modern fire alarm system.

Dubuque, Ia.—Chief Reinfried has recommended purchase of auto engine and 2,000 ft. of hose.

Waterloo, Ia.—Fire Committee has recommended purchase of auto fire engine and hose wagon and that chemical engine at Station 2 be placed on auto trucks and driven by motor power, two testing pumps, two smoke helmets, two interchangeable hose connections and better fire alarm system.

Port Limon, La.—Town is considering purchase of modern apparatus.

Belmont, Mass.—Purchase of auto apparatus is being considered.

Gardner, Mass.—Chief Hogdon has recommended erection of fire station at West Gardner.

Gloucester, Mass.—Board of Engineers has recommended purchase of 1,500 ft. of hose.

Marion, Mass.—Town will vote on purchase of two hose reels and 600 ft. of hose and erection of two fire houses.

Newburyport, Mass.—Mayor Burke favors erection of fire station.

North Grafton, Mass.—Purchase of chemical engine is being considered.

Palmer, Mass.—Fire District will be asked at annual meeting to buy an automobile for fire fighting purposes.

Plymouth, Mass.—Town will vote on purchase of second-class steamer.

Worcester, Mass.—Hose Co. No. 7 has asked for more hose.

Duluth, Minn.—Board of Fire Commissioners will consider plans for hall to replace Fire Hall No. 3.

St. Paul, Minn.—Bids will be received March 4 for $25,000 bonds for fire houses.

Kansas City, Mo.—Citizens will vote April 5 on $125,000 fire department bonds.

Manchester, N. H.—City will have flying squadron, also auto chemical.

Newfields, N. H.—Town will vote on purchase of fire extinguisher.

Paterson, N. J.—Fire Commissioners will advertise for bids for auto fire engine.

Perth Amboy, N. J.—Council is considering purchase of site at corner of State and Easton sts. for erection of fire house.

Plainfield, N. J.—Chief Engineer T. O. Doane has recommended purchase of 2,000 ft. of hose.

Endicott, N. Y.—Installation of fire alarm system favored; cost $1,800.

Geneva, N. Y.—Nester Hose Co. is considering acquirement of new quarters.

Port Chester, N. Y.—Volunteer Hook & Ladder Co. is considering purchase of auto hose wagon.

Columbus, O.—Mayor Marshall has recommended purchase of $7,000 auto truck for Hilltop section.

New Philadelphia, O.—Citizens have asked $2,000 appropriation for purchase of hook and ladder truck.

Portland, Ore.—Alberta Street Improvement Association is urging erection of engine house.

Ambler, Pa.—Ambler Fire Co. is raising funds for purchase of equipment.

Beachview, Pa.—Need of hose and chemical engine is being considered.

Darby, Pa.—Darby Fire Co. No. 1 proposes to erect fire house this year.

North Wales, Pa.—Purchase of chemical engine is being considered.—J. Weikel, President Committee.

West Hazleton, Pa.—Fire company has asked for additional hose and paraphernalia.

Williamsport, Pa.—South side firemen are urging need of fire hose.

Witmer, Pa.—Purchase of chemical engines is being considered.

Providence, R. I.—Fire Commissioners will purchase modern truck.

Providence, R. I.—Board of Aldermen has passed resolution for location of fire alarm boxes in public school buildings.

Providence, R. I.—Finance Committee is considering resolution directing City Solicitor to apply to Legislature for permission to obtain $40,000 loan for placing wires of fire alarm telegraph system underground.

Amarillo, Tex.—Citizens will vote March 23 on $10,000 bonds for subfire station and equipment.

Corpus Christi, Tex.—Fire Chief Ed. Shoemaker will purchase necessary hose and nozzles.

McKinney, Tex.—Committee, Alderman S. T. Hammond, Chairman, will select site for proposed fire station and city hall; $10,000 bonds sold.

Falls Church, Va.—Town has decided to equip fire department with modern apparatus.—E. A. Kimball, Chief.

Burlington, Vt.—Council has passed resolution to purchase three fire alarm boxes and 1,000 ft. of hose.

Hillyard, Wash.—Redistrict city and install a complete fire alarm system is plan being advocated by E. T. Kertson, Chairman of the Fire Committee of Council.

Tacoma, Wash.—Council has decided to advertise for bids for erection of $5,000 station on tide lands.

Laramie, Wyo.—City will at once purchase 500 ft. of cotton woven hose.

CONTRACTS AWARDED

Rome, Ga.—Auto chemical, to Seagraves Co.

Baltimore, Md.—Engine house, to Fidelity Construction Co., $30,000.

Irvington, N. J.—Fire tank, to Peter Persch & Co., New York City, $1,790; three other bidders.

Gloucester, Mass.—Hose wagon for Defiance Co., to O. F. Kress & Son, Lawrence, $850.

Jackson, Miss.—Automatic aerial truck, to Seagrave Apparatus Co., Columbus, O., $5,700.

Oklahoma City, Okla.—Fire station, 21st st. and Western ave., to McCall & Harwood, $4,400.

Temple, Tex.—Fire station, to G. H. De Bord, city, $3,000.

ELECTRIC RAILWAYS

Fort Smith, Ark.—Fort Smith Light & Traction Co. has decided to extend its line to Arkansas River.

Lodi, Cal.—People of Lockeford and Tokay colony are urging construction of electric line from Stockton to their towns. Dr. J. G. Priestly is interested.

Oakland, Cal.—Council has granted petition of Peninsular Railway Co. for franchise for comprehensive street car system.

Red Bluff, Cal.—Northern Electric will extend its line from Chico to Red Bluff either this summer or early next spring.

Santa Rosa, Cal.—Petaluma & Santa Rosa Railroad will shortly be extended to Guerneville.

Vallejo, Cal.—Vallejo Traction Co. has been incorporated; capital $200,000; Directors are M. H. Meacham, President of Goodman Co. Bank of Napa; Joseph Levison, of Napa; Theodore Bell, of Napa; Dr. E. Z. Hennessey, of Napa, and C. G. Doty, Superintendent of Terry Lumber Co., Vallejo.

Pueblo, Col.—Pueblo & Suburban Traction & Lighting Co. will build 4-mile extension from Pueblo to the City Park.—J. F. Vail, General Manager.

Lagrange, Ga.—Franchise has been granted to Messrs. Akin and Preston, of Macon, C. M. Awtrey and G. E. Dallas, city, for electric street railway.

Peoria, Ill.—Peoria Northern Railway Co. has been incorporated to construct line from city to Village of Bureau, in Bureau County. Incorporators and first Board of Directors are: H. E. Chubbick, city; W. H. Carnahan, Champaign; H. J. Vance, H. C. Dillon and W. J. Achelpohl, city.

Peoria, Ill.—Peoria Southern Railway Co. has been incorporated to construct line from city to Pekin, in Tazewell County; capital stock $2,500. Incorporators and first Board of Directors are H. E. Chubbick, city; W. H. Carnahan, Champaign; H. J. Vance, H. C. Dillon and W. J. Achelpohl, city.

Portland, Ind.—Council has granted new franchise asked by the Fort Wayne & Springfield Railway Co. for an extension of its traction line from Decatur to Portland.

Charles City, Ia.—Charles City Western Railway Co. has been incorporated by local people.

Olathe, Kan.—The Kansas City, Lawrence & Topeka Electric line has obtained order from Commissioners of Johnson County for condemnation of right of way from its present terminus at Shawnee to Zarah, six miles west.

Frankfort, Ky.—Business Men's Club is considering steps to secure building on to Frankfort of electric interurban line, which will extend from Cincinnati, through Grant, Owen and other counties to Louisville under plans drawn by J. W. Blackburn, of Grant County.

Louisville, Ky.—Plans are now on foot for building electric railroad from Glasgow to Hodgenville, distance about 50 miles; cost of building and equipping road, power house and all will be $1,000,000; corporation will be known as the Louisville, Lincoln Farm & Mammoth Cave Traction Co.

Chicopee, Mass.—Mayor Fletcher has approved Springfield Street Railway's plans and specifications for proposed East st. line.

Hamtramck, Mich.—Arthur O'Connor and Matthew Finn have applied to Council for franchise to build electric railway.

Hannibal, Mo.—Hannibal Railway & Electric Co. wil build three miles of additional track this year.—J. S. Mainland, Purchasing Agent.

Springfield, Mo.—F. C. Yentsch, of Mount Vernon, is interested in organization of company to build an interurban railroad from Sprigfield to Carthage, distance about 60 miles.

Long Branch, N. J.—Atlantic Coast Electric Railway Co. has asked permission to extend its tracks from Atlantic ave., in Pleasure Bay, to boundary line of Monmouth Beach.

Auburn, N. Y.—Public Service Commission, Second District, has ordered Auburn & Syracuse Electric Railroad Co. and Auburn & Northern Electric Railroad Co. to lay double track on State st.

New York, N. Y.—Application to operate six miles of surface railways through public parks in the Bronx has been made by Union Railway and Bronx Traction Co.

Schenectady, N. Y.—Schenectady Railway Co. will double track Edison ave. this spring.—General Manager Peck.

Gastonia, N. C.—Charter has been granted Isothermal Traction Co., with authority to build electric railway from Rutherfordton to Gastonia; capital stock $100,000.

Cleveland, O.—Municipal Traction Co. will build a new crosstown line on west side in connection with the general plan of improvements to cost over $3,000,000.—W. T. Cook, 620 Electric Bldg., Superintendent.

Dayton, O.—Cincinnati, Dayton & Fort

Wayne Railway Co. is planning to begin construction this spring on proposed line.—Sam F. Glover, Davies Bldg., President.

Ardmore, Okla.—Ardmore Traction Co. is considering extension of line up North Washington st.

Chickasha, Okla.—Chickasha Street Railway Co. has been incorporated to construct six-mile electric railway in Chickasha, Grady County; capital stock $150,000.—Charles F. Woodward and W. Raymond Emerson, of Wakefield, Mass.; Lawrence Martin,, R. D. Welborne and W. P. Weston, city, Directors.

Portland, Ore.—Alameda Land Co. has asked for extension of Broadway street car line.

Harrisburg, Pa.—Midland Pennsylvania Railroad Co. has been chartered and will extend line through towns of Killinger, Berrysburg and Gratz, Dauphin County, and Sacramento, Valley View, Hegins, Weisample, Maple and Gordon, in Schuylkill County, 43 miles; capital $430,000. Incorporators are Walter E. Harrington, Pottsville; John F. B. Atkins, Franklin C. Dively, William M. Sheahan, William A. Radford, Philadelphia; Edward A. Price, Chester; Robert J. Ritchie, Frank A. Apple, Joseph B. Lanning, Philadelphia, and Harry B. Reeves, Woodbury, N. J.

Phœnixville, Pa.—Phœnixville, Strafford and Valley Forge Trolley Co. is securing rights of way.

Brownsville, Tex.—B. G. Stegman, San Antonio, and associates, have made application for street car franchise.

Bingham City, Utah.—Eccles interests have decided to extend line of Ogden and Northwestern from Hot Springs to this city; distance 12 miles.

Salt Lake City, Utah.—E. O. Howard is asking franchise for interurban railway.

Ettricks, Va.—Civic League, W. N. Eanes, Secretary, is urging extension of trolley line into village.

Hampton, Va.—Council authorized City Attorney William C. L. Taliaferro and Street Committee to proceed with building of wagon bridge and foot bridge authorized by Council.

Walla Walla, Wash.—Walla Walla Interurban Railroad will be built over Blue Mountains.

Mannington, W. Va.—To construct and operate electric railway in Mannington and other parts of Marion and Wetzel Counties the People's Utility Company has been chartered. Incorporators: W. R. Martin, C. R. Phillips, W. T. Smith, N. H. Smith, Mannington; I. D. Morgan, New Martinsville.

Wellsburg, W. Va.—Wellsburg, Bethany & Washington Railway Co. will apply to Council for franchise over certain streets and alleys.

Calgary, Alta., Can.—Calgary Electric Railway Co. will build nine miles of new track.—T. H. McGauley, Superintendent.

BRIDGES

Decatur, Ala.—Board of County Commissioners will build two iron bridges across Flint River.

Los Angeles, Cal.—County Board of Supervisors have adopted plans for construction of bridge across Rio Hondo River on Whittier road.

Red Bluff, Cal.—War Department has approved application of Tehama County for permission to build drawbridge across Sacramento River at Tehama.

San Rafael, Cal.—County Supervisors have decided to advertise for bids for construction of bridge connecting Belvedere and Tiburon.

Ventura, Cal.—Santa Paula citizens have asked Supervisors for construction of bridge over Santa Paula Creek.

Colorado Springs, Col.—Boards of Commissioners of El Paso, Douglas, Denver and Arapahoe counties are considering construction of two bridges on highway from Colorado Springs to Denver; cost $7,500.—Chas. W. Comstock, Denver, State Engineer.

Eatonton, Ga.—County Commissioners have ordered construction of three iron bridges.

Anderson, Ind.—Indiana Union Traction Co. is preparing to build bridge over White River.—H. A. Nicholl, General Manager.

Bloomington, Ind.—County will erect overhead bridge, cost, $3,500, over Kemal pike at Harvey Stephenson crossing.

Lebanon, Ind.—Bids will be received by Boone County Board of Commissioners in about two months for construction of steel span bridges.—C. C. Tancel, County Engineer.

Fort Dodge, Ia.—Contract will soon be let for erection of proposed 3d st. viaduct.—S. J. Bennett, Mayor.

Leon, Ia.—County Commissioners have ordered construction of 13 bridges throughout County.

Winfield, Kan.—County Commissioners are considering construction of bridge across Arkansas River.

Shreveport, La.—Engineer Ira G. Hedrick, Keith & Ferry Bldg., Kansas City, Mo., is preparing plans for two 240-ft., five 150-ft. span bridges and two girder approaches across the Red River.

Farmington, Me.—Iron bridge will be constructed over Canabasset River at Kingfield.

Annapolis, Md.—Engineer Little has estimated cost of proposed Madison st. bridge extension at $1,610.

Boston, Mass.—Construction of a bridge from Adams sq. to Central sq., East Boston, is being considered.

Boston, Mass.—Plans have been prepared by Engineer Jackson for repairing Meridian st. bridge; cost $150,000.

Lawrence, Mass.—Essex County Board of Commissioners is considering constructing iron bridge across Merrimack River.—A. D. Marble, City Engineer.

Fergus Falls, Minn.—City has decided to construct steel bridge.—S. A. Levorsen, City Clerk.

Kathio, Minn.—Town has voted $12,000 bonds for bridges and roads.

Minneapolis, Minn.— Board of County Commissioners has decided to construct bridge at the "Narrows," Lake Minnetonka; cost, about $30,000.

St. Cloud, Minn.—City Engineer Arthur E. Steiner has been instructed by Council to prepare plans for construction of bridge across river at 4th ave.

St. Paul, Minn.—Minnesota and Wisconsin Commissions on bridge connecting Taylor's Falls and St. Croix Falls have decided to have L. P. Wolfe draw plans and specifications for proposed bridge and to advertise for bids, either for concrete, steel, or both.

St. Paul, Minn.—Bids will be received March 4 for $75,000 bonds for Earl st. and Lexington ave. railroad bridges.—E. J. Bishop, City Controller.

Meridian, Miss.—City Engineer W. G. Wetmore will prepare plans and specifications and advertise for bids on construction of two concrete bridges.

Kansas City, Mo.—Engineer Ira Hedrick, Keith & Perry Bldg., have finished plans for construction of reinforced concrete bridges in Swope Park.—F. P. Gossard, Secretary Board of Park Commissioners.

New London, Mo.—County Commissioners have decided to construct bridge over Spencer Creek.

Springfield, Mo.—Plans have been prepared for proposed viaduct on Grant st., over Jordan Valley.

Omaha, Neb.—Street Committee has recommended that City Attorney be instructed to draw ordinance for bridge over Birmingham Belt Railroad at 12th ave. and 53d st.

Nashua, N. H.—City Engineer E. O. Hathaway is preparing plans for bridge to replace present one at Taylor's Falls.

Bridgeton, N. J.—War Department has granted Cumberland County permission to erect proposed Mauricetown bridge.

Mays Landing, N. J.—Board of Trade is urging construction of overhead bridge at Estelville rd. crossing.

Paterson, N. J.—Philadelphia & Reading Railway will construct bridge to eliminate grade crossing.

Trenton, N. J.—New Jersey & Pennsylvania Traction Co. is arranging for construction of two additional steel spans across Stoney Brook.

Lockport, N. Y.—Board of Trade is considering matter of movable bridges between this city and Pendleton.

New York, N. Y.—Bids will be received by Kingsley L. Martin, Bridge Commissioner, March 3, 2 P. M., for furnishing and delivering yellow pine, white pine and spruce lumber to Brooklyn Bridge.

New York, N. Y.—Bids will be received March 3, 3 P. M., by the Park Board for furnishing all the labor and material for completely erecting foot bridge at the falls, Bronx Park.

Syracuse, N. Y.—Council will soon order construction of two bridges over Onondaga Creek, one at Dickerson st., cost $11,000 and the other at Brighton ave., cost $7,500.

Newton, N. C.—Catawba County Commissioners will construct steel bridge across Catawba River.

Coshocton, O.—Coshocton County Commissioners have decided to rebuild bridge near Newcomerstown recently destroyed; cost about $8,877.

Dayton, O.—City Engineer Cellarius has estimated cost of proposed bridge across Wolf Creek at $16,000.

Girard, O.—Engineer Wilson will prepare plans for bridge at Liberty and Main sts.

Astoria, Ore.—County is considering construction of bridge across Elk Creek.

Sellwood, Ore.—Residents of this suburb are urging construction of bridge across Willamette River.

Norristown, Pa.—Montgomery County Commissioners have concluded to rebuild bridge over Wissahickon Creek, in Whitemarsh Township.

Wilkes-Barre, Pa.—Scofield Engineering Co., Philadelphia, has been selected by Luzerne County Board of Commissioners to design and superintend construction of the proposed bridge across Susquehanna River.

Galveston, Tex.—County Commissioners are considering erection of bridge over Sydnor's Bayou.

Palacios, Tex.—Erection of bridge across Tres Palacios Bay is being considered by business men.

San Antonio, Tex.—Council has authorized Galveston, Harrisburg and San Antonio Railway to construct viaduct at Hays st.

Sherman, Tex.—City and Texas Traction Co. will erect reinforced concrete bridge over Postoak Bayou on West Lamar st.; cost $3,500.

Big Stone Gap, Va.—Citizens have voted $14,000 bonds for bridge over Powell River, street improvements and sewers.

Tacoma, Wash.—Council is considering ordinance providing for construction of reinforced concrete viaduct on N. 23d st.

Waitsburg, Wash.—Foot bridge is to be constructed over Touchet River to serve until Boston ave. bridge is rebuilt.

Milwaukee, Wis.—Bids will be received by Board Public Works, Chas. J. Poetsch, Chairman, March 1, for concrete retaining wall at end of Highland Bould. viaduct, 15th ward.

Cheyenne, Wyo.—County Commissioners have decided to erect bridge across N. Platte River at Wyncote.

CONTRACTS AWARDED

Chico, Cal.—Reinforced concrete bridge over Chico Creek, to Chico Construction Co., $2,165.

Oakland, Cal.—Replanking Bay Farm Island bridge, to Hyde, Harper & Co., $2,377; four other bidders.

Champaign, Ill.—Iron bridge over Sangamon River, to Pan-American Bridge Co., New Castle, Ind., $5,995.

Columbia, Miss.—Steel bridge across Little River, to Joliet Bridge Co., Joliet, Ill., $2,098.—L. C. Wellborn, Clerk, Board of Supervisors.

Bridgeton, N. J.—Two bridges across raceway, to Ogden & Platt, City, $3,376.

Rye, N. Y.—Constructing concrete bridge with rubble abutments and retaining walls on Highland rd., to Kennedy & Easton, Albany.

North Bend, Ore.—Drawbridge on South Slough, to Victor Anderson, $7,785.

Pendleton, Ore.—Four steel bridges to Atlas Bridge Co., Portland, $8,000.

Reading, Pa.—Constructing concrete arch bridge over Wyomissing Creek, bids opened Feb. 10, to Willauer & Co., Pottstown.

Salt Lake City, Utah.—Concrete aqueduct and catch basin, City Park Canyon, to P. J. Moran, $25,192.08.

Tacoma, Wash.—Steel viaduct over N. 23d st., to C. F. Graff, Seattle, $47,495.

BIDS RECEIVED

Los Angeles, Cal.—Concrete bridge on Huntington Drive: Ornamental Brick Co., $6,785; H. A. Peterson, $8,570; A. Dontanville, $5,967; O. R. Beyrle, $8,839; Arthur S. Bent, $7,406, and Mercereau Bridge & Construction Co., $6,100.

Topeka, Kan.—Rebuilding Maple Hill bridge—Topeka Bridge & Iron Co., superstructure, $4,695; piers, $6,500. Morse Construction Co., piers, $5,000. R. E. French, superstructure, $5,750. Leavenworth Bridge Co., superstructure, $4,600; piers, $5,360. Brookville Bridge Co.,, Brookville, O., superstructure, $3,972. Monarch Construction Co., Falls City, Neb., superstructure, $4,495. Dildine Bridge & Iron Co., Cameron, Mo., superstructure, $4,890; piers, $5,890. Missouri Valley Bridge Co., Leavenworth, Kan., completed bridge, $10,000, irregular.

MISCELLANEOUS

Decatur, Ala.—Erection of city hall is being considered.

Troy, Ala.—County Commissioners have decided to erect stone mile posts on all roads leading to this city.

Chico, Cal.—City Trustees will call election on $50,000 bonds for city hall and site.

Long Beach, Cal.—City Engineer Dewey has completed plans for steel and concrete pier to be constructed at Devils Gate; cost about $440,000.

Los Angeles, Cal.—Water Board proposes to erect $150,000 building at corner of 5th and Oliver sts.; plans prepared.

Redwood City, Cal.—Election on $150,000 public improvement bonds is being considered.

Washington, D. C.—If Congress complies with special request of President Taft, $230,000 will be appropriated for immediate improvement of that section of Potomac Park south and east of Pennsylvania railroad embankment.

Statesboro, Ga.—City has purchased site for erection of City Hall.

Chicago, Ill.—Frank T. Fowler, Superintendent of Streets, plans to remove garbage, ashes and all waste matter by night on street cars.

Anderson, Ind.—City will vote March 15 on installation of municipal steam heating plant.

Indianapolis, Ind.—Board of Health is considering $200,000 expenditure for improvements, including erection of children's and contagious disease hospitals.

Cedar Rapids, Ia.—Purchase of auto patrol wagon is being urged.

Hutchinson, Kan.—When new sprinkling contracts are made this spring some provision will be made for sprinkling at least part of streets with oil.—G. L. McLane, City Engineer.

Kansas City, Kan.—City will sell $200,000 city hall bonds on March 8.

Bar Harbor, Me.—Improvement Association is considering construction of incinerator for refuse and garbage, to be in operation by next summer; place has 10,000 population in summer and 5,000 in winter.—L. E. Opdyke, 117 E. 69th st., New York City, President.

Annapolis, Md.—Council will ask Legislature for permission to hold election on $24,000 permanent improvement bonds.

Berlin, Md.—Council has decided to at once erect building to house Council, police and fire departments.

Hyattsville, Md.—City is considering improvements.—William P. Magruder, Mayor.

Beverly, Mass.—Aldermen have voted $8,000 for remodeling city hall.

Boston, Mass.—Mayor Fitzgerald has sent order to Council providing $125,000 appropriation for ferry boat.

Boston, Mass.—Establishment of playground in Ward 5, Charleston, is being considered.

Falmouth, Mass.—Enlargement of town hall is being considered.—H. H. Fay, Chairman Special Committee.

Lynn, Mass.—Plans have been prepared for alterations at city hall; cost $13,000.

Lynn, Mass.—Board of Works has recommended $25,000 appropriation for establishment of municipal street sprinkling plant.

Malden, Mass.—Street and Water Commission has asked for following appropriations: Trimming trees, $500; street signs, $400; sand storage shed, $1,500, and gypsy and browntail moths, $4,000.

Duluth, Minn.—Police Chief Troyer has recommended enlargement of city jail.

Excelsior Springs, Mo.—Site has been deeded to city for establishment of city park.

Kansas City, Mo.—Citizens will vote on April 5 on following bonds: Parks, $700,000; city market, $75,000; levee improvements, $75,000; House of Correction, $50,000; incinerating plants, $200,000; tuberculosis hospital, $50,000; armory, $350,000; art museum, $250,000, and isolation hospital for children, $75,000.

Hackensack, N. J.—Senate has passed bill authorizing Hackensack to erect municipal building.

Roselle, N. J.—Borough is considering election on $20,000 bonds for erection of municipal building, including fire house and police station.

Trenton, N. J.—Finance Committee is considering $8,000 appropriation for better cleaning of streets.

Yonkers, N. Y.—Council has passed ordinance authorizing $13,000 local improvement bonds.

Dayton, O.—Council is considering ordinance compelling all railroads to elevate or lower tracks.

The Dalles, Ore.—Bids will be received March 16, 8 p. m., for $21,500 improvement bonds.

Pawtucket, R. I.—Council has passed resolution appropriating $6,524 for Memorial Park.

Bristol, Tenn.—Bristol may establish public bath house for the poor.

Columbia, Tenn.—City is considering erection of $10,000 City Hall.

Knoxville, Tenn.—J. W. Flenniken, Chairman Board of Public Works, has recommended better quarters for police department and installation of Bertillon measurement system.

McKinney, Tex.—Council has appointed committee, S. T. Hammond, Chairman, to select location for proposed City Hall and fire station; $10,000 is available.

San Antonio, Tex.—Finance Committee will consider purchase of four street flushing machines.

Waco, Tex.—Citizens have voted $35,000 bonds to purchase park sites.

Clarendon, Va.—Citizens' Association is considering erection of suitable building.—T. I. Donnelly can be addressed.

Parsons, W. Va.—City will erect two-story city hall.

Wheeling, W. Va.—Committee will be appointed to investigate all types of incinerating plants and report to Council.—Geo. Mooney, Member of Committee.

CONTRACTS AWARDED

Mobile, Ala.—Addition to patrol station, to Jett Bros., $2,526.

St. Helena, Cal.—Care of Sewage farm and septic tank, to J. Zopfy, $65.25 month.

Macon, Ga.—Automobile patrol wagon, to Waverly Electric Co.

Lexington, Ky.—Sweeping and cleaning streets, to Home Construction Co., $40,000.

Newark, N. J.—Disinfecting plant, smallpox hospital, to Jaehnig & Peoples, $5,250.

Bryan, Tex.—City hall and theater, to G. C. Street, Jr., Houston, $15,000.—Jones & Taber, Houston, Architects.

San Antonio, Tex.—Police uniforms, to Singer Co., Chicago.

Park City, Utah.—Cleaning streets, to Charles W. Ahlberg, $220.

Staunton, Va.—Removal of garbage, to J. F. Landes, $1,749.

Tacoma, Wash.—Automobile for Commissioner of Public Works, to American Automobile Co., $1,785.

BIDS RECEIVED

Sacramento, Cal. — Police Automobile — Rambler, $3,050; Pope, $4,000; Studebaker, $4,800.

Lexington, Ky.—Crematory—Perkins & Brickens, $6,500; Shelby Miller & Co., $6,750; Buford A. Graves, $6,475.50.

Mt. Vernon, N. Y.—Eradication of insects—R. F. Planta, 267 South First ave., $1.08 per tree; Inter-State Tree Treating Co., $1.23 per tree.

Mt. Vernon, N. Y.—Garbage Removal—Vincent Arallone, first year, $13,500; second year, $14,000; third year, $15,500. Frank C. Elis. first year, $15,500; second year, $16,000; third year, $18,300. Guarino & Covino, first year, $13,000; second year, $14,000; third year, $15,000. Frank Nordone, first year, $11,475; second year, $12,470; third year, $13,450. James McCaffery Co., first year, $14,750; second year, $15,750; third year, $16,750. Louis Petrillo, first year, $9,350; second year, $10,000; third year, $12,000. Dooling & Kenlon Contracting & Trucking Co., first year, $16,000; second year, $17,000; third year, $18,000.

TOO LATE FOR CLASSIFICATION

STREET IMPROVEMENTS

Daphne, Ala.—Bids will be received Mar. 19 by Baldwin County Commissioners, for grading 33 miles of road and three bridges.

Brunswick, Ga.—Extension of street paving on Newcastle st. is being urged.

Danville, Ind.—Bids will be received Mar. 15, 10 a. m., for construction of four highways.—A. S. Leininger, Chairman, Hendricks County Commissioners.

Evansville, Ind.—Board of Works will order extension of Madison ave.

Tufton, Ind.—Bids will be received Mar. 4, 7 p. m., for construction of cement sidewalk, curb and gutter.—W. C. Howard, City Clerk.

Richmond, Ind.—Wayne County Commissioners are considering improvement of National rd.; cement curbs and gutters are asked for distance of three miles.

Des Moines, Ia.—Bids will be received Mar. 7, 10 a. m., for construction of brick and cement sidewalks for year ending Mar. 31, 1911.—G. F. Poorman, City Clerk.

Leesville, La.—Bids will be received Mar. 8, 4:30 p. m., for construction of 30,000 sq. ft. of concrete sidewalk and curb—J. R. Sterns, City Engineer.

Denton, Md.—County Commissioners will build 1½ miles of road in Second District.

Flint, Mich.—Board of Supervisors has decided to expend $9,000 on road improvements.

Kansas City, Mo.—County Court has approved plans for grading and draining five new roads, involving an expenditure of approximately $50,000.

Lincoln, Neb.—Bids will be received Mar. 4, 1 p. m., for paving alley, paving district No. 50.—R. C. Ozman, City Clerk.

Basking Ridge, N. J.—Bid will be received by Township Committee, Bernards Township, Mar. 9, 2 p. m., for construction of Dumont road at Far Hills; total length, 1,342 feet; and section of Claremont road at Bernardsville; total length, 1,770 feet.—Antony Schimacher, Bernardsville, Township Engineer. Jos. B. Kronenberg, Clerk.

New York, N. Y.—Board of Estimate has released more than $700,000 in appropriations for street paving contracts, which have been held up since July last.

St. George, S. I., N. Y.—Bids will be received Mar. 8, noon, for furnishing and delivering 36,000 tons of broken stone and screenings in three stone districts.—Geo. Cromwell, President.

Cincinnati, O.—Bids will be received Mar. 18, noon, for improving Madison Road, Sycamore Township.—Fred. Dreihs, Clerk, Hamilton County Commissioners.

Cleveland, O.—Bids will be received Mar. 19 for paving on Richmond road, Euclid Township.—Jno. F. Goldenbogen, Clerk, Board of Cuyahoga County Commissioners.

Sandusky, O.—Bids will be received Mar. 5, noon, for furnishing crushed stone to macadamize and repair streets during year.—Jos. Loth, Clerk, Directors of Public Service.

Holdenville, Okla.—City Engineer is preparing plans for paving 18 blocks of paving.

The Dalles, Ore.—City will pave 3d st. with bitulithic.

Coatesville, Pa.—Supervisors of Chester and Lancaster counties are considering repair of pike between Coatesville and the Gap.

Knoxville, Tenn.—J. W. Flenneken, Chairman Board of Public Works, has recommended purchase of rock crusher.

Mountain View, Tenn. — Committee, Councilman Jas. Meek, chairman, has been appointed to select City Engineer; city will expend $20,000 on street work.

Winchester, Tenn.—Citizens will vote March 19 on $200,000 bonds for building county pikes.

Dallas, Tex.—Bids will be advertised for paving Patterson and Rose aves.

Cheney, Wash.—Paving and sidewalk improvements are being considered.

Seattle, Wash.—Bids will be received Mar. 8, 2 p. m., for improving, bridging and macadamizing State aid road No. 61.—H. L. Bowlby, Secretary, State Highway Board.

Milwaukee, Wis.—Committee on Streets and Alleys has decided to improve three streets with macadam, three with brick and one with stone.

Neenah, Wis.—Bids will be received Mar. 14, 2 p. m., for grading, curbing and guttering and paving Sherry st. with concrete.—C. B. Clark, Chairman, Board of Public Works.

CONTRACTS AWARDED

Alva, Ia.—Barnes ave. improvements, to G. A. Heman, Chickasha, Okla.; approximate quantities and prices: Excavation, 9,050 sq. yds., 35c.; Trinidad sheet asphalt paving, 15,230 sq. yds., $2.09; concrete curb and gutter, straight, 10,800 lin. ft., 68c.; concrete curb and gutter, radius 6 ft., 510 lin. ft., at 90c.; furnishing and laying vit. sewer pipe, including excavation and backfill, 710 lin. ft., 10-in., 50c.; 1,040 lin. ft., 12-in., 70c.; 840 lin. ft., 15-in., 90c.; 840 lin. ft., 15-in., $1.10; 720 lin. ft., 18-in., $1.10; 720 lin. ft., 21-in., $1.35; 920 lin. ft., 24-in., $1.65; 48 catch basins, each $35; 12 manholes, each, $38; 1,780 lin. ft. Oak headers, 15c.; total cost $50,457.

East Orange, N. J.—10,000 tons of cracked stone to Eagle Rock Quarry Co.

Galveston, Tex.—Paving, to Kelso & Vautrin, city; 1,183 sq. yds. vit. brick paving, 4-in. concrete base, $2.09; 10,790 sq. yds. vit. brick paving, sand base, $1.57; 152 cu. yds. extra concrete, $6.75; 2,500 sq. yds. 4-in. concrete base, 70c.; 192 lin. ft. concrete curbing, 50c.; 176 lin. ft. concrete bulkheads, 30c.; total, $20,180.

Petersburg, Va.—Roadway improvement on Market st.: Washington Asphalt Block & Tile Co., on asphalt block, $2.15 per sq. yd.; Atlantic Bitulithic Co., pavement, $2.20 per sq. yd.; Perkinson & Finn, on granite block, $2.47 per sq. yd.; Perkinson & Finn, on vit. brick, $2.13; I. J. Smith & Co., Inc., on granite block, $2.15; I. J. Smith & Co., Inc, on Portsmouth granite block, $2.05; I. J. Smith & Co., Inc., on Baltimore vit. brick, $1.99; Coleman Contracting Co., on granite block, $2.60; Coleman Contracting Co., on vit. brick, $2.23.

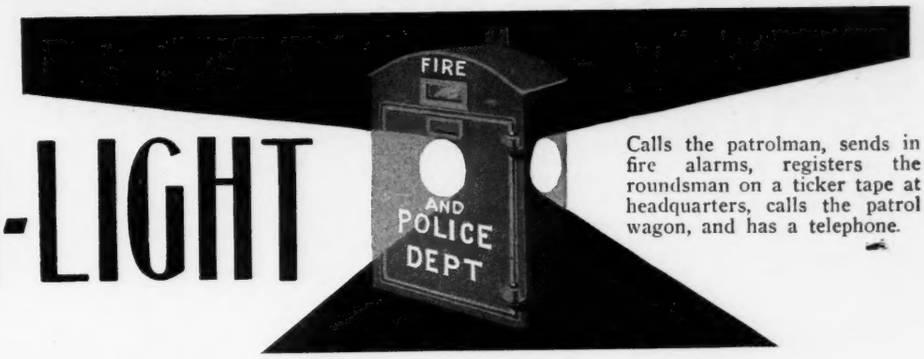
SEWERAGE

Greeley, Colo.—Bids will be received by W. A. Hotchkiss, City Clerk, for furnishing material and laying several lines of sewer in Sewer Dist. No. 45; separate bids on furnishing material and doing work in either glazed or cement tile.

Rock Island, Ill.—Mayor McCaskrin has recommended completion of west half of Seventh Ward sewer system.

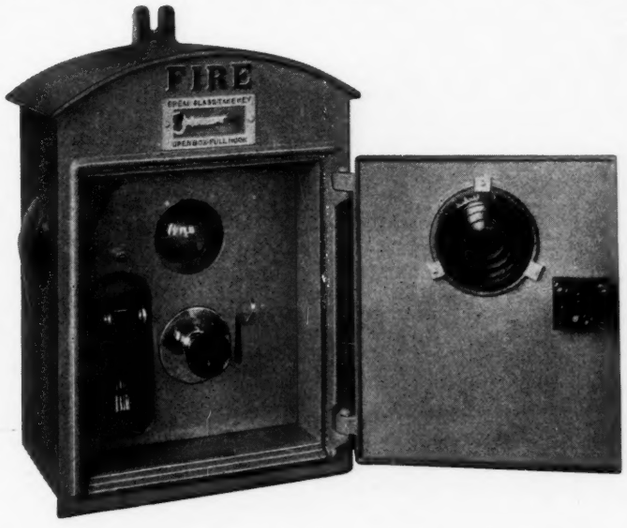
Des Moines, Ia.—Bids will be received

Patrol FLASH-LIGHT System



Calls the patrolman, sends in fire alarms, registers the roundsman on a ticker tape at headquarters, calls the patrol wagon, and has a telephone.

A Combination Police and Fire Box, with three powerful red lenses that are visible from three directions for at least 500 yards in the daytime and for miles at night.



The boxes are located in each district, so at least one light is always within line of vision of the officer on that beat.

The telephone part of the equipment is of the best quality. All noisy lines and interruptions are completely removed.

The Patrol Flash-light system has passed the experimental stage. All installations are giving satisfactory results. The patrol boxes are heavily constructed and are neat in appearance. The outer door forms a moisture proof covering when closed.

The Patrol Flash-light system can be purchased outright and at a reasonable price, or a complete system may be installed and maintained, on a rental basis. Write us for details.

Front View of Switchboard at Police Headquarters

FLASH-LIGHT

The distinctive feature of this apparatus is the FLASH-LIGHT idea. It enables police headquarters, at any time of the day or night, to reach any roundsman *instantly*. Simply throwing a little switch lights powerful red lamps on any beat or all over the city. This signals the officers to come to the telephone for instructions.

RESERVES

Just think of it—you could assign your station reserves to regular beats and still be able to reach them as promptly as though they were asleep in the next room. The Patrol FLASH-LIGHT System more than trebles the efficiency of your force.

FIRE ALARMS

The illustrations show the location of the public key compartment. The hook is pulled in the usual manner—nothing new or confusing. The police are also notified along with the fire department. The lamp lights when the alarm is sent in and is extinguished when the fire chief replaces the broken glass. Illuminated flash-light pilots fire department.

REGISTRATION

Roundsmen's reports are automatically printed on a ticker tape at headquarters, by simply pulling the hook—the fire alarm circuit does not operate until the glass is broken. The telephone is not used in reporting. Constant attendance is not required at the headquarters' switchboard—the automatic registrations become indisputable records of each beat.

WAGON CALL

The wagon is called by depressing the button over the receiver, after the registration hook has been pulled. No telephoning necessary.

TELEPHONES

The talking apparatus is the standard Dean Electric Indestructible equipment. Dean telephone apparatus is well known all over the world by up-to-date telephone men. Ask any Independent telephone man. The Dean Electric Company is an old established concern—see Dun's or Bradstreet's.

The Dean Electric Company

Elyria, Ohio, U. S. A.

Mar. 31, 9 a. m., for furnishing sewer and drain pipes for use of several departments for year.—G. F. Poorman, City Clerk.

Roosevelt, N. J.—Council has adopted ordinance for construction of 8-in. sewers on five streets in Carteret section.

De Soto, Mo.—S. C. Campbell is designing sewer system; correspondence desired with companies handling supplies for such work.

Amherst, O.—Council has selected L. E. Chapin, Canton, to prepare plans and specifications for sewer system.

Niles, O.—Council has decided to construct sewer on Mill st.

Niles, O.—Council has passed ordinance for purchase of property for site of sewage disposal plant.

Oklahoma City, Okla.—Plans and specifications for five new sanitary sewer districts have been prepared by City Engineer; estimated cost, $100,000.

Greenville, S. C.—Council will consider calling election on $40,000 bonds for improving sewerage system.

Dallas, Tex.—City will lay 6-in. sewers in Lemmon ave. and Kimball st.

Sedro Woolley, Wash.—Engineer Miller, Seattle, will prepare plans for proposed sewerage system.

West Allis, Wis.—Council will issue $10,000 sewer extension bonds.

CONTRACTS AWARDED

Erie, Kan.—Sewer construction to W. W. Cook & Son, Junction City, $26,745.02.—Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., Engineers.

Ardmore, Okla.—Septic tank to R. J. Meredith & Co., Terre Haute, $21,909.55.

WATER SUPPLY

Huntsville, Ala.—Curley Light & Power Works Co. desires deep-well steam pump, to lift 500 or 600 gals. of water per hour 100 ft.

Monrovia, Cal.—City will soon let contract for supply of pipe to complete water system.—Henry Gierlich, City Engineer.

El Centro, Cal.—Citizens have endorsed $69,000 bond issue for acquirement of municipal water system.

Waterbury, Conn.—Bids will be received March 14 for $200,000 water bonds.

Bunnell, Fla.—Installation of water works plant is being agitated.

Bloomington, Ill.—Council is gathering data as to best style of pump to install at water works.

Waterloo, Ia.—Board of Water Trustees has adopted plans for adequate water works system; prices will be secured on all needful material and labor, which include: Two new pumps at the pumping station, of a capacity of 4,000,000 gallons daily, each; rearrangement of the pumping station to accommodate them; third new artesian well; big storage reservoir; shipment of 1,000 tons of water pipe, with privilege of increasing order to 1,500 tons if it can be laid; treating plant to get rid of the iron formation in artesian water and 200 meters for installation this coming season.—G. E. Shoemaker, Secretary.

Kansas City, Kan.—Bids will be received Mar. 4 for sluice gates and valves.—W. Kiersted, Water Works Bldg., Kansas City, Mo., Consulting Engineer.—J. E. Barker, Secretary, Board of Trustees.

Gloucester, Mass.—Water Commissioners have instructed Superintendent J. W. Moran to secure specifications for connecting up dynamo at pumping station.

Summit, Miss.—Dr. V. Simmons desires prices on pumping station.

Vicksburg, Miss.—Bids will be received Mar. 7, 8 p. m., for laying water mains in various streets.

Huron, S. D.—Bids will be received Mar. 4, 7:30 p. m., by Council for furnishing and laying water mains.—L. P. Wolff, St. Paul, Minn., Consulting Engineer.

Medford, Okla.—Citizens will vote March 8 on $12,000 bonds for water works improvements.—O'Bannon & Foster, Blackwell, Engineers.

Scranton, Pa.—Scranton Gas & Water Co. has decided to build reservoir in Freytown.

Brady, Tex.—Brady Water and Light Co. will at once install 100 h.p. gasoline engine directly connected to 250-volt D. C. generator, and 150,000 elevated tank; also 3,000 ft. 8-in., 1,000 ft. 6-in. and 3,000 ft. of 4-in. pipe, as soon as purchase can be made; 20-ton ice machine will also be erected.—A. M. Martin, Manager.

Snyder, Tex.—Streets of this place have been surveyed, looking to calling of special bond election for water works system.

Vernon, Tex.—Citizens will vote April 4 for $15,000 water works extension bonds.

CONTRACT AWARDED

Ashland, Kan.—Water and electric light plant from plans of J. S. Worley Co., Kansas City, Mo.: General contract, to Squire Electrical Construction Co., Kansas City, Mo., $2,283; hydrants and valves, to Western Valve Co., Kansas City, Mo., $729; engines, to Fairbanks-Morse Co., Kansas City, Mo., $3,600; tank and tower, to Chicago Bridge & Iron Works, Chicago, $3,478; electrical machinery, to Westinghouse Mfg. Co., $1,998.

Erie, Kan.—Water works and lighting plant; following contracts to F. M. Clark, Savannah, Mo.: general contract, $17,418.70; power house, $4,700; hydrants, $1,080; c. i. pipe, $6,685.11; electrical equipment, $3,000; lighting equipment, $694.35; high-speed engine, 1,250; pumps, $1,400; tower and tank work to Penn Bridge Co., $3,370, and chimney to Wiederholdt Construction Co., $1,200. Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., Engineers.

Central Point, Ore.—Constructing water works, bids opened Feb. 15, to Jacobson Bade Co., Portland, $21,300.

LIGHTING AND POWER

Mesa, Ariz.—South Side Gas Co. has decided to erect gas plant.—H. L. Chandler, Superintendent.

Los Angeles, Cal.—City Engineer Hamlin has estimated cost of lighting Pico st. as follows: 188 ornamental lamp posts, $20,680; 188 transformers, $2,820, and current and lamps, $10,966.

Clinton, Ia.—City is considering installation of boulevard system of lighting.

Kansas City, Kan.—Boulevards are to be lighted with natural gas; 185 lights will be installed; cost $3,145.

Kalamazoo, Mich.—Council is considering construction of electrical station; cost $30,000.

Lansing, Mich.—Water and Light Commissioners are considering purchase of another unit for lighting plant.

Fairfax, Minn.—Citizens have voted $5,000 bonds for installation of electric light system.

Barnesville, O.—Bids will be received Mar. 17, noon, for lighting streets with electric lights.—F. W. Hilles, Village Clerk.

Fort Worth, Tex.—Bids will be received Mar. 7, 10 a. m., for elevator power and electric lighting of county jail and court house.—C. J. McKenna, County Auditor.

Provo, Utah.—Henry J. Blumenthal has asked Council for franchise to build and operate a gas plant and to lay pipes through streets.

FIRE EQUIPMENT

Bridgeport, Conn.—Fire Commissioners will purchase gasoline engine; type not yet selected.

Evanston, Ill.—Mayor Jos. E. Padeu is urging purchase of motor-driven fire fighting apparatus; cost, $10,000.

Elwood, Ind.—Council is arranging for purchase of quantity of fire hose.

Long Branch, N. J.—Fire and Water Committee has recommended purchase of 1,500 ft. of Maltese Cross hose and some chemical hose, 40 pairs rubber boots, 2 hose jackets, 4 play pipes, rebuilding of Atlantic engine and other minor improvements.

Trenton, N. J.—Board of Fire Commissioners have asked for $5,000 for installing automatic fire alarm repeater.

Trenton, N. J.—Hamilton Township Committee has arranged for erection of two-story brick building, to be used for new hose carriage of township fire equipment.

Brady, Tex.—City will purchase fire equipment consisting of hose and combination wagon.—A. M. Martin, Manager, Brody Water & Light Co., can be addressed.

ELECTRIC RAILWAYS

San Bernardino, Cal.—Board of Supervisors has granted franchise to W. W. Pool to operate railway over certain streets in county.

Atlanta, Ga.—Council has granted Georgia Railway & Electric Co. franchises to build new lines through certain streets.

Jacksonville, Ill.—Morgan County Commissioners have granted franchise to Springfield & Jacksonville Electric Railway Co. to build railway through Morgan County.

Gilbert, Minn.—Mesaba Traction Co. has been granted franchise to construct electric railway. W. D. Chapman, Chicago, Ill., and W. M. Prindle, Duluth, are interested.

Englewood, N. J.—Hudson River Traction Co., Hackensack, has applied to Council for franchise to continue to extend its railway to Highwood.—A. A. Robertson, Edgewater, Chief Engineer.

Englewood, N. J.—Council has granted New Jersey and Hudson River R. R. Co.'s application for extension of lines to city limits.

Wilson, N. C.—B. F. Lane has applied to Board of Aldermen for franchise to build street railway.

Oklahoma City, Okla.—Oklahoma City and Panhandle Railroad Co. will construct proposed line within 90 days; cost, $3,000,000.—A. Key, City, President.

San Marcos, Tex.—City has granted 20-year street railway franchise to C. L. Hopkins and associates.

Norfolk, Va.—Council has adopted ordinance granting street railway franchise in Colonial pl. to Norfolk & Portsmouth Traction Co.

Kent, Wash.—Valley Railroad & Power Co. has applied to Council for franchise to operate electric railway; proposed railway will connect Kent and Renton.—A. T. West, Seattle, General Manager.

CONTRACT AWARDED

Gatesville, Tex.—Temple, Northwestern Railway, to W. J. McDaniel.

BRIDGES

Daphne, Ala.—Bids will be received Mar. 19 by Baldwin County Commissioners for erecting 3 bridges and grading 33 miles of road.

Georgetown, Col.—Bids will be received Mar. 19, noon, for construction of concrete steel bridge across Clear Creek.—P. W. Comstock, State Engineer.

Tremont, Ill.—Bids will be received Mar. 5, 2 p. m., for construction of Miller and Creek's bridges in Elm Grove Townwship.—F. H. Homfeld, Township Clerk.

Auburn, Ind.—De Kalb County Commissioners will soon ask for bids for construction of 25 bridges and arches in county.

Bloomington, Ind.—Bids will be received by W. A. Walace, 198 Federal st., Chicago, Ill., Engineer Monon Railroad, or by County Commissioners at Bloomington for construction of 50-ft. span of overhead steel bridge over Stephenson crossing.

Kansas City, Kan.—Bids will be received Mar. 14 for construction of reinforced concrete culvert.—J. H. Lindsay, County Engineer.

St. Marys, Kan.—Citizens have voted $6,000 bonds for constructing bridge over Kansas River.—J. F. Hay, City Clerk.

Denton, Md.—Engineer Paine will build three reinforced concrete bridges.

Ann Arbor, Mich.—Bids will be received Mar. 5, 7:30 p. m., for construction of two-span concrete bridge.—E. W. Graves, City Engineer.

Lansing, Mich.—Bids will be received Mar. 7, for construction of bridge across Grand River at South st.—H. A. Collar, City Engineer.

Kansas City, Mo.—Citizens will vote April 5 on $200,000 bonds for bridges.

Mauricetown, N. J.—War Department has approved plans for repairs on Maurice River bridge.—Freeholder Geo. Reeves, Chairman, Committee.

Huron, S. D.—Bids will be received Mar. 4, 7:30 p. m., for construction of lateral sewers. L. P. Wolff, St. Paul, Minn., Consulting Engineer.

Bellefontaine, O.—Bids will be received Mar. 14, 1 p. m., for construction of superstructure of bridge No. 97 over Miami River. W. L. Jones, County Auditor.

Cleveland, O.—Bids wil be received Mar. 19, 11 a. m., for construction of concrete bridge on Richmond road.—J. F. Goldenbogen, Clerk, Board of County Commissioners.

Dayton, O.—West Side residents are urging erection of bridge over Wolf Creek.

Lima, O.—County Commissioners have rejected as too high bids received for constructing steel bridges.

Oklahoma City, Okla.—Board of County Commissioners is considering construction of bridge at Rockywood ford, Packingtown.

Greenville, S. C.—Council will consider calling election on $200,000 bonds for erection of bridge over Reedy River and paving Main st.

CONTRACT AWARDED

Washington, Pa.—Bridge over Wheeling Creek to Nelson-Merydith Co., $1784; substructure work to Henry Messenger; $3.71 per cu. yd. for stone work and 40c. for grading.

MISCELLANEOUS

Dawson, Ga.—Water and Light Department desires 250-h.p. heater to heat water for steam boilers.—W. R. Baldwin, Chairman.

Indianapolis, Ind.—Council is considering ordinance appropriating $1,500 for Pentecost municipal fire shelter house.

Muncie, Ind.—Board of Works is considering purchase of street sweeper.

Evanston, Ill.—Mayor Jos. E. Padeu is urging erection of city hall; cost, $35,000.

Kansas City, Kan.—Street signs are to be placed in Argentine.

Winchester, Ky.—City has rejected all bids received for city hall and sewerage bonds.

Fall River, Mass.—Board of Aldermen is considering $100,000 loan for erection of incinerating plant.